



FRIDAY, FEBRUARY 28, 1902.

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## Contributions

## The Saturday Half-Holiday.

The Algoma Central & Hudson Bay Railway Co.,  
Sault Ste. Marie, Ont., Jan. 30, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

As we are having considerable discussion on the question of Saturday half-holiday, can you give me any information as to the proportionate number of firms, especially railroad shops and offices, contract shops, etc., that have accepted the Saturday half-holiday. I am, of course, aware that a large number of mercantile houses, and most of the business offices, have made a practice of closing Saturday noon for some time back, but was more particularly interested in getting at about the proportionate number of railroad offices, shops, etc., through the country that are following this same plan.

If you can give me any information regarding this matter, I shall be very much obliged,

H. M. PERRY, Master Car Builder.

[Perhaps some of our readers will be good enough to tell Mr. Perry what they are doing in this matter and what their impressions are.—EDITOR.]

## The Engineer and the Administrator.

St. Joseph, Mo., Feb. 22, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

In the article headed "A New York Central Defect" in your issue of Feb. 14, signed by "Solon," there is such a palpable effort to advance the engineer as the be all, end all, of modern railroad management that I think a word of protest not uncalled for.

There is no need of inserting dashes for names, all the railroad world knows the official under consideration to be Mr. William C. Brown. Most of us know pretty well the positions he has held in the past, and not a few of us have formed our estimate of him as an official and a man from years of more or less close personal dealings.

It would not be out of place, in my judgment, to take exception to "Solon" in what may be stated as his summing up of Mr. Brown's strong points, viz.: "Orderly qualities as a clerk, reliability as a telegrapher and train despatcher and capacity to handle men as a general superintendent." This is all well enough, but "Solon" seems to think that is all there is to Mr. Brown. I don't agree with him. A record of ten years as General Manager on the C. B. & Q. (one of the roads in the country where the position of General Manager still means something—where the Manager really does manage) is not even alluded to.

And pray, Mr. Solon, how did Mr. Brown get where he did on the C. B. & Q.? Was it from his utter inability to "check methods"? Was it due to his burning the midnight oil as a "student of landslides, collisions and undue expenses already incurred"? Does Mr. C. E. Perkins, who has been the active head of the Burlington System for years, and who stands at the top as an organizer of men, select his assistants from those who "cannot safely weigh the accomplishments of the able men in the motive power and engineering departments and promote them for merit?"

The general idea among us who know Mr. Brown is that he was promoted for merit—commanding merit—and I fail to see the logic of assuming that because of that fact, Mr. Brown, in turn, will not recognize merit in those under him. "Merit," in its broadest sense, is just

what railroad directors and managers are on the constant lookout for, and for which they are willing to pay large salaries.

The technical man with the technical education is good just as far as he will go—how far that is or may be, rests mainly upon himself—and personally I wish him all success upon the upward climb. The gentleman under consideration has shown a high order of integrity, ability and grasp on both policies and details. He is cool, accurate, level-headed. He can meet the public successfully and instill loyalty to his company among the men under him.

Like "Solon," I think a railroad is a "complicated machine"; the man at the head has to deal with all the subordinate parts, technical as well as of a practical business nature.

Solon's theory would work out as follows: Suppose J. P. Morgan were taken ill; he sends for his doctor, admittedly because the physician knows more about medicine and the cure of disease than does Mr. Morgan and a cure is effected. Then Solon's argument, carried out logically, would require Mr. Morgan to turn over his banking business and financial interests to a specialist—in this case the doctor. So far so good. The next ill that befalls Mr. Morgan is not of a bodily nature, but one that requires the "professional knowledge" of a lawyer. He is employed, is successful and the only consistent course now is to put the specialist in law in charge of Mr. Morgan's business. A similar train of circumstances produces similar results, and in the course of time we would find a dozen or more specialists, many of whom no doubt would "have learned beforehand to read drawings," engaged in trying to run Mr. Morgan's business. Does Solon or anyone with ordinary sanity believe they would be successful?

The fact is that executive ability of a high order is the prerequisite needed for Mr. Brown's position and he is evidently considered by the New York Central Board of Directors to have that.

D.

[Surely Mr. Brown needs no defence; his record is his sufficient justification. As we read "Solon's" letter, it was not a criticism of any individual, but of a method. We are confident that he is one of the last men in the world who could be accused of a lack of respect for or appreciation of Mr. Brown's abilities and character.—EDITOR.]

## A Baldwin Four-Cylinder Balanced Compound for the Plant System.

[WITH AN INSET.]

Last week we noted the completion of the twenty-thousandth locomotive of the Baldwin Locomotive Works at the close of the seventieth year of the company's operation. These events were celebrated by a dinner at the Union League Club, in Philadelphia, yesterday (Thursday) evening.

The locomotive, No. 119, of the Plant System, was designed by Mr. S. M. Vauclain, General Superintendent of the Baldwin Locomotive Works, and Mr. W. E. Symons, Superintendent of Motive Power of the Plant System. It is a ten-wheel, four-cylinder, balanced compound, suitable for heavy passenger or fast freight work, and is somewhat like the De Glehn four-cylinder balanced compound. It differs in this, however, that the high-pressure cylinders are inside the frames and the cross-heads of those cylinders are connected to cranks in the first driving axle; the cross-heads of the low-pressure cylinders, which are outside of the frames, are connected to crank pins which are in the first pair of driving wheels, and but two valves are used to control the four cylinders. The cylinders are all on the same horizontal plane and in connecting all cross-heads to one axle the arrangement becomes more like the Strong balanced compound locomotive with which our readers are familiar.

We gave an outline description of the Plant locomotive in the *Railroad Gazette*, page 684, Oct. 4, 1901, wherein reference is made to an article on balanced and other compound locomotives, published in our issue of the previous week, Sept. 27, 1901, page 661. When the information which we published in that October issue was received it was intended that the low-pressure connecting rods should attach to crank pins in the second pair of drivers, but one of the features, shown by illustrations that we now give, is the attachment of the connecting rods of all cross-heads to the first axle and the location of the eccentrics on the second axle. With this distinction kept in mind, the further description will be easier to read.

The boiler and tender are of the Vanderbilt designs and while the dimensions, and contours of the boiler shell, have been made to conform to the present need, the work on these parts is so generally similar to that of the Illinois Central engine, No. 64, which was illustrated in the *Railroad Gazette*, May 31, 1901, that we shall refer the reader to those drawings and not illustrate the boiler and tender.

The cylinders are 15 and 25 x 26 in. The boiler is of the wagon-top type, 62 in. in diameter in the first course and 80% in. at its greatest diameter, the thickness of the sheets being  $\frac{17}{32}$  and  $\frac{11}{16}$  in. The height of center above rails is 9 ft. 2 in. The working steam pressure is 200 lbs. per sq. in. and the fuel is soft coal. There are 341 steel tubes, 15 ft. long and 2 in. in diameter, giving 2,665 sq. ft. of heating surface. The fire-box is 131 in. long by 55 in. diameter inside and has 128 sq. ft., making the total 2,793 sq. ft., for a grate area of 27.25 sq. ft.

The driving wheels are 73 in. in diameter, and the centers are cast steel with bronze hub plates. The journals are 8½ x 12 in. The driving wheel-base is 14 ft. 1 in.; the total wheel-base of engine is 29 ft. 2 in., and the total wheel-base of engine and tender is 56 ft. 8¾ in. The total weight of engine is 176,510 lbs., 49,500 lbs. of which is on the engine truck and 127,010 lbs. on the driving wheels. The tender will carry nine tons of coal and 5,000 gals. of water and when empty weighs 39,340 lbs. Two Symons boltless cast-steel trucks are used under the tender. The side frame of the truck is of steel cast in one piece, and the boxes are slipped into their openings and secured in place by keys. The truck frame is fastened to the bolster in a similar manner. The only nuts used are those at the ends of the keys. The wheels are 36 in. in diameter with cast-steel plate centers and steel tires, held by shrinkage and double lip retaining rings. The axles are of open-hearth steel and the journals are 5 in. in diameter and 9 in. long.

The engine frames are of hammered iron, and their arrangement in relation to the cylinders and saddle is shown in the cross-sectional views. The main rods are 6 ft. 11½ in. long from center to center and they and the parallel rods are of I section, forged steel. The driving wheel tires are of open-hearth steel 3½ in. thick and flanged, 5½ in. wide. All driving axles are of steel and the crank-axle is of open-hearth steel made by the Bethlehem Steel Co. The axle journals are 8½ x 12 in., the same as for the other driving axles, and the crank-journals in the axle are 8½ in. diameter by 3½ in. long, while the main crank-pins outside are 7 x 4½ in. The saddle is cast in halves, each half containing one high-pressure and one low-pressure cylinder and a valve chamber. This is Mr. Vauclain's latest arrangement of compounding with four cylinders, as we have earlier described it.

The valve chamber is above the cylinders and its center-line is on the same vertical plane as the center-line of the frames below. The valve-gear is Stephenson link, and the common two-armed rock-shaft is used. The valves are balanced piston, with three distinct valve heads made in one casting, as illustrated herewith. This valve is also the design of Mr. Vauclain and he holds patents on it and on the general design of cylinder and other acting parts. The valves are 15 in. diameter, travel 5 in. in full gear; steam lap high pressure 1 in., low pressure ¾ in.; exhaust clearance high pressure ¼ in., low pressure ¾ in.; lead in full gear high-pressure line and line, low pressure ¼ in. The eccentric throw is 5½ in. The steam and exhaust ports are 34 in. x 1½ in. (circular), and the bridge widths are 1½ and 2½ in.

The valve motion and connections are practically the same as in ordinary single-expansion locomotive practice, a single set of valve-motion actuating each side of the engine with its high-pressure and low-pressure cylinders. The four piston rods are of the same size, 3 in. diameter, made of solid steel and the pistons are fitted with snap rings and Peacock packing ring joints. Each of the four pistons is connected with a cross-head, of the alligator type, working in separate parallel guides. The piston rods and other stems are all fitted with United States metallic packing. The valve admits steam to the high and low-pressure cylinders in such a manner that the high and low-pressure cross-heads work in opposite directions, starting their stroke at opposite ends of the guides. To make plain the circulation of steam in the valves and cylinders, with the sectional view of the valve and a half view of the ports before the reader, as shown on the Inset, it is only necessary to say that the middle head of the valve has inside admission to the high-pressure cylinder; that the valve body is hollow throughout and each end head of the valve gives outside admission to the low-pressure cylinder; and that the exhaust from the high-pressure cylinder passes through the body of the valve to the low-pressure ports. The steam supply port and the final exhaust passage are central to the length of the valve, and the respective ports are all direct—that is, not crossed. The cross-heads are of open-hearth cast steel, with bronze shoes and the guides are steel, one guide-yoke holding them all.

Summing up the relations of the cranks to each other and the benefits expected, we quote from some descriptive matter sent us by the builders. "The low-pressure cross-heads and guides on each side of the locomotive are located outside the frames and the cross-head is coupled with the main driving wheel which, in this locomotive, is the front wheel, by a connecting rod, as in ordinary practice. In addition, the main axle has two cranks, set at right angles to each other, one on each side of the center of the locomotive; and each crank is coupled to a cross-head of one of the high-pressure pistons. The crank on the axle and the crank pin in the wheel for the corresponding high and low-pressure cylinders are set at an angle of 180 degrees. The two axle cranks being set at 90 degrees, brings the action of each high and low-pressure cylinder on one side of the locomotive quartering with the equivalent cylinder on the opposite side.

"The steam passages in the cylinders are so designed that there are no pockets where water can collect.

"Certain advantages are expected of this system of compounding, besides the recognized ones of economy of fuel and steam. The most important one is that by a crank axle connected with pistons traveling in opposite directions from each other an almost perfectly balanced engine is secured. The main driving wheels are practically self-counterbalanced by the positions of the inside cranks with relation to the outside crank-pins and their respective connections. It is only necessary to counterbalance

such portions of the main wheels as are not sufficiently balanced by the cranks. The other driving wheels are counterbalanced each for its own rotating weight. As the reciprocating weights of the high and low-pressure pistons and their connections move in opposite directions at the same time, they are within a few pounds of each other and the locomotive is only out of balance to that small extent. Thus we have a machine that will allow the maximum load on the driving wheels without detriment to the track, there being no unbalanced rotating weight in the wheels to either tend to lift the wheel or exert additional weight on the rail. As an offset to the objections pertaining to a crank-axle, and the duplication of guides, cross-heads and main-rods there is no variation in the vertical stress upon the rails, and consequently no need of allowing for it in the weight put on the driving wheels. The boiler can be made as large as the engine will carry, the speed of the locomotive is increased and it can attain its maximum speed with minimum risk. This combination of the large boiler with the perfection of balance makes the locomotive well adapted for drawing fast, heavy passenger trains."

In the *Railroad Gazette*, Sept. 28, 1900, pages 629 to 631, we gave illustrations and descriptions of four-cylinder compound locomotives in France, which will be found very valuable to our readers, in view of this present development in the United States. There is also an editorial in that issue, page 638, that covers some of the points just quoted, and carries the consideration a great deal further than it is possible to do here. Mr. Symons has kindly arranged to give all necessary data and information for a record of the performance of locomotive No. 119.

#### Testing Triple Valves.

Mr. T. A. Hedendahl, inspector for the Westinghouse Air Brake Co., brought a device for testing triple valves to the attention of the January meeting of the Rocky Mountain Railway Club, and an illustration of it is given herewith; also the nature of tests recommended by the Westinghouse Co., and the way to test

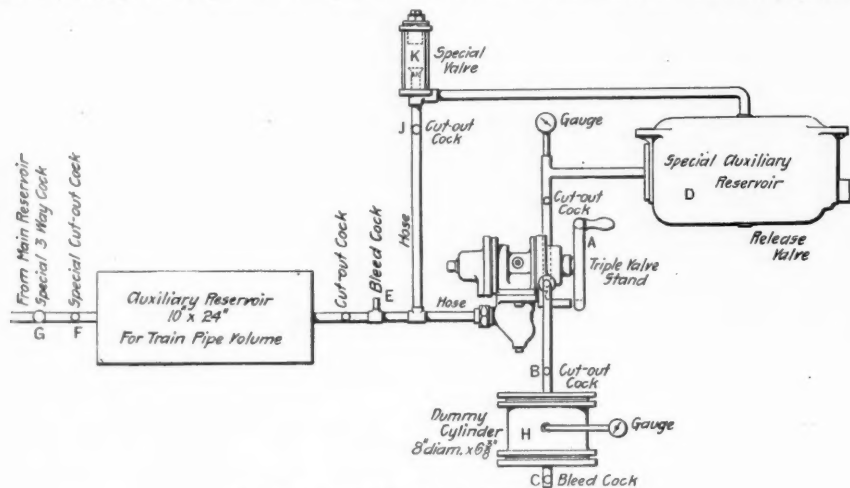


Diagram of Triple Valve Testing Device.

for the several defects. The following extracts and the illustration are taken from the published Proceedings of the Club:

These tests are recommended:

No. 1. For packing ring leakage.

No. 2. For release.

No. 3. For tightness of slide valve; also emergency and check valves, and general freedom from leakage through castings or gaskets.

No. 4. Examination of fit of packing ring.

**Test No. 1.**—By means of handle (A), which should be screwed in to its extreme position, block triple piston in the graduating position. Close cut-out cocks (B and J), also bleed-cocks (C and E), leaving the others open. The maintenance of 70 lbs. pressure per sq. in. in the train pipe should not result in leakage by the piston sufficient to give more than 15 lbs. pressure per sq. in. in the reservoir (D), in less than one minute.

**Test No. 2.**—Unscrew handle (A), to its extreme position in order to allow normal action of the triple valve. Observe that cut-out cock (J), and bleed-cocks (E and C), remain closed, as in Test No. 1, but open cut-out cock (B). Charge the auxiliary reservoir (D), to 70 lbs. pressure, and make full service application, reducing train pipe pressure through three-way cock (G), until the pressure in auxiliary reservoir (D), and cylinder (H), equalizes. Then open cut-out cock (J), bringing into use special valve (K), which is connected with the train pipe on the one side and with the auxiliary reservoir (D) on the other side, and so constructed that by means of various weights, a predetermined difference in pressure per square inch is maintained on the opposite sides of the triple piston. This difference has been fixed as follows:

Type of Triples.	Difference in Pressure per Square Inch.
B-25, F-27, F-36.	1 $\frac{3}{8}$ lbs.
G-24	2 $\frac{1}{16}$ lbs.
F-25, F-29, F-46.	2 $\frac{7}{16}$ lbs.
F-24	1 $\frac{15}{16}$ lbs.

Assuming that the proper weight for the particular form of triple valve undergoing test has been provided and installed in special valve (K), proceed as follows:

Place special cut-out cock (F), in such position that air flowing into the reservoir representing train pipe volume shall pass through the  $\frac{3}{16}$ -in. diameter opening in said cock, and then, by means of three-way cock (G), turn main reservoir pressure into the train pipe through this restricted opening, which is expressly provided to prevent any sudden rise of pressure or surge of air beyond. Under this treatment all triples should be released without raising the weight in special valve (K) so as to allow train pipe and auxiliary reservoir pressure to equalize.

**Test No. 3.**—The tightness of the slide valve in all positions; also the emergency and check valves, and the general freedom of the triple from leaks through castings or gaskets should be determined by painting with soap-suds.

**Test No. 4.**—The triple piston packing ring must be examined and known to be fitted so that the ends come neatly together when in the cylinder, and, at the same time be absolutely free in its groove. Entire freedom from dirt, and lubrication of parts with a small quantity of high-grade oil, is important.

#### The Locomotive.\*

##### I.

The boiler and engine of a locomotive are similar in their general character to the boiler and engine which go to make up a stationary power plant. Each exists for the purpose of converting into work the potential energy of fuel. There are differences in the details of mechanism, and in the conditions under which work is performed, but the principles underlying action are the same.

As compared with the locomotive, the stationary plant has an advantage in being fixed in its position. It may be so arranged that all its parts are accessible to attendants, who in doing their work pass freely from one element to another, and any detail which is better when made large can be given such dimensions as will insure its efficient and otherwise satisfactory performance. In

The designer of a locomotive, moreover, is forced to recognize the fact that the machine with which he is concerned constitutes but one of many elements that go to make up the material property of a railroad. The width between the wheels of his engine is prescribed by the gage of the track, and the length of its wheel-base by the curvature of track, the length of turn-tables, and the dimensions of other facilities at the terminals of the road. The extreme width and height of the machine must come within the limits of clearance which are allowed on either side and above the track; for the locomotive which he designs must pass station platforms, and run underneath bridges and through tunnels.

... Restrained by limiting conditions which are absolute, and acting under the influence of a growing demand for increased power, the locomotive designer has been obliged to consider economy in the use of fuel as a matter of secondary importance. The problems of reducing noise and of abating smoke have received such attention as the conditions have allowed, but each proposition dealing with these purely secondary questions has of necessity been weighed by him with reference to their effect on the output of power. He knows that smoke from a locomotive can be suppressed, but he also knows that in accomplishing this object the firing will be interfered with and the power of the locomotive will be reduced. There is in fact no serious defect in the working of the modern locomotive that is not understood and appreciated by the locomotive designer. He allows them to exist because all efforts to overcome them appear to work to the disadvantage of more important characteristics of his machine. . . .

When one is inclined to criticize the locomotive because it is somewhat less economical in fuel than the stationary plant, or because it sometimes sends out a little smoke or a few sparks, he should consider the limitations under which the designer works and find in them an explanation and defense.

#### RATES OF COMBUSTION AND DRAFT.

It has already been shown that the locomotive is a small machine, when measured by the amount of work demanded of it, and it follows that some or all of its parts are worked to a higher pitch than the similar parts of plants which have more liberal dimensions. This statement is especially true in its application to the locomotive fire-box; for the power developed by locomotives is derived from the fuel it burns, and, other things being equal, whatever operates to increase the amount of coal consumed contributes to an increase of power. With a steady growth in the size of locomotives, there has been a corresponding increase in the amount of coal to be handled, until now it is not uncommon for a modern engine to consume as much as 5,000 lbs. or more for each hour it runs, or 83 lbs. a minute. . . .

Soft coal upon a grate in the open air will burn at the rate of about 3 lbs. an hour for each square foot of grate surface. In a heating stove, under usual conditions of draft, there may be burned about 5 lbs. for each foot of grate, and under a stationary boiler connected with a good stack, the rate may increase to 10 or even to 20 lbs. per foot of grate. Again, in naval practice with a closed stack-hole and draft forced by blowers, the rate of combustion is occasionally carried as high as 50 lbs. per foot of grate per hour, but this value may be accepted as the maximum rate at which fuel is burned for the purpose of generating steam, except in locomotives. In the narrow fire-boxes of locomotives, under the lightest service incident to common practice, the rate is between 50 and 100 lbs., and good practice allows it to rise above 150 lbs., or to three times the rate attained under the conditions of forced draft in naval service. Nowhere are fires urged to greater intensity except in forges or in furnaces employed for metallurgical purposes. . . .

In spite of the gradual increase in grate area which has been noted, rates of combustion per unit of grate-area have not greatly declined in recent years. Such progress as may have been made in securing enlarged grates has done but little more than to keep pace with the increased amounts of fuel demanded to increase the power of engines. The rate required for the development of varying amounts of power, is well shown by results obtained in a series of tests made upon the Purdue experimental locomotive. This locomotive is now to be regarded as one of rather small size. It weighs 85,000 lbs., has 17 x 24-in. cylinders and during the tests was run at a speed of 35 miles an hour with a wide-open throttle and a steam pressure of 130 lbs. The conditions and results as to consumption of coal, all of which may be accepted as within the limits of good practice, are as follows:

Cut-off, Inches.	Horse-power.	Total lbs. coal per hour.	Coal per sq. ft. of grate per hour.
6	300	1,262	72
8	434	1,978	113
10.5	495	3,133	179

... The draft employed in boilers of stationary plants with good stacks, is from 0.1 to 1.4 in. of water. In naval practice, with closed stack-hole and forced draft, it is from 1 to 4 in., while in a locomotive burning bituminous coal, it ranges from 3 to 10 in., depending upon the service, the character of the fuel, and the condition of the fire. Under ordinary conditions of service it does not often fall below 6 in., which is equivalent to a difference of pressure between that of the atmosphere and that of the gases of the front-end of 13 lbs. per sq. ft. Such a draft is quite comparable in intensity with that employed to urge the fire of a blacksmith's forge, though in the latter case the area affected is

\*Abstract from advance sheets of a book now in press entitled "Locomotive Sparks," by W. F. M. Goss. To be issued by John Wiley & Sons, 43 East Nineteenth street, New York.



small, while in the former case, the full area of the grate is affected. The relation between draft and rate of combustion for the experimental locomotive of Purdue University is as follows:

Reduction of Pressure in Front-end as Compared with Pressure of Atmosphere.		Pounds of Coal per sq. ft. of Grate per Hour.	
Inches of water.	Pounds per sq. ft.	Brazil (Ind.) Block.	New River.
2.00	10.40	64.14	53.00
3.34	17.37	113.46	81.00
4.30	22.36	146.62	100.00

### Some New Brown Hoisting and Conveying Machinery.

The illustrations here given show some of the latest work of the Brown Hoisting Machinery Company, as used on railroads. Fig. 1 shows part elevation and part sectional views of what is thought to be an ideal coaling station built on the Brown-hoist principle for coaling, supplying sand and water, and handling the ashes from locomotives. The arrangement is that of a plant recently put in at King's Mines near Newark, Ohio, except that the King's Mines plant has no ash conveyor.

As indicated in Fig. 2 the mines are about 1,000 ft. from the tracks, and a cable-way with a bucket carrying about half a ton to the trip supplies coal to the coaling station at the tracks, dumping directly into the storage pocket. The pocket is new in use but was invented by Mr. Alex. E. Brown about 10 years ago. The capacity of the pocket is about 50 tons and the bin is suspended en-

lock themselves in their former position automatically, and are then ready for filling, which is done quickly by one of the attendants, by means of a proper valve for the purpose.

The transaction described in the foregoing paragraph includes the use of a set of Fairbanks scales by which the coal is weighed into the bucket at each call of the oncoming locomotive; for example, one, two, three or more tons of coal, as called for by blasts of the whistle of the locomotive, are weighed into the bucket before the locomotive has come to a stop, and the coal is ready for delivery when the engine comes under the chute.

The construction of this and other plants for similar work is entirely of steel, and as indicated by the illustrations the structure is very compact and durable. There is a strong movement towards steel for such work, the security from fire risks being one of the strong considerations in its favor.

### A Code of Rules for Per Diem.

At the meeting of the Central & Western Association of Car Service Officers held in Chicago, Feb. 27, a report on per diem rates for car service was presented by a committee consisting of Messrs. W. E. Beecham, (C. M. & St. P.); H. L. Hunter, (M. St. P. & S. S. M.); and H. J. Merrick, (L. S. & M. S.). Following is the substance of this report:

Your committee does not believe it necessary at this

urges the enforcement of demurrage on all cars detained under load or in process of loading beyond 48 hours regardless of the character of the traffic. Demurrage is compensation, not for storage but for loss of revenue caused by undue detention. The public interest requires that cars be returned to service within a reasonable time to better enable the railroads to perform their public functions; therefore, demurrage rules should be uniform throughout the country.

Per diem cannot be successfully inaugurated without the aid and consent of all lines in competing territory; and it would not be wise for a few lines to try the experiment without waiting for enough support to insure success.

The adoption of per diem will necessitate the reorganization of the Car Service Department and will result in considerable additional expense, as ample latitude must be allowed to employ sufficient help to meet the new requirements of distribution and accounting. As all car owners will be benefited by the increased efficiency that will be accomplished by the employment of such additional force as may be necessary it would seem as if the mutual interests of railroads demanded united action.

In the event of the adoption of per diem it will be necessary to have a code of rules to govern its operation; but the fewer and simpler the rules, to start with, the better. . . . The following suggestions are offered:

First: The daily "interchange reports" made by agents to car accountants shall be closed at 12 o'clock midnight, and the correctness of the exchange of cars shall be certified to by agents of the lines interested at points of interchange. These reports will form the basis of settlement between railroads after being verified in the Car Accountant's office.

Second: Car Accountants will make a daily report of all foreign cars that have cleared the reporting line by being delivered to the owners or to some other connection. This report must show the initials and numbers of all foreign cars thus delivered, together with the date of receipt of the cars and the number of days each has been in possession of the reporting road. The receiving line will check this report at once, and if errors are found they must be called to the attention of the reporting line and corrections made, after which the re-

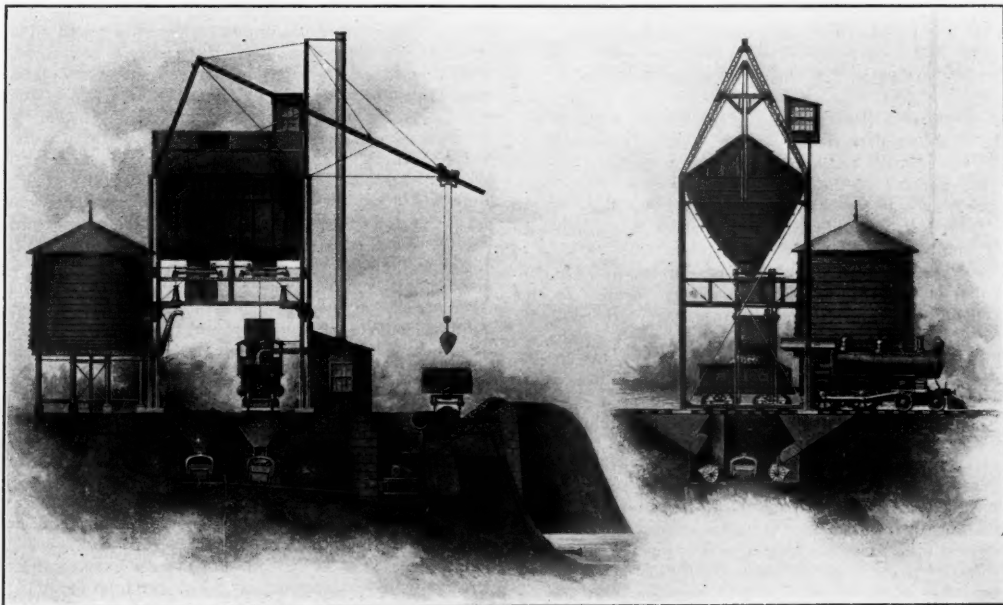


Fig. 1.

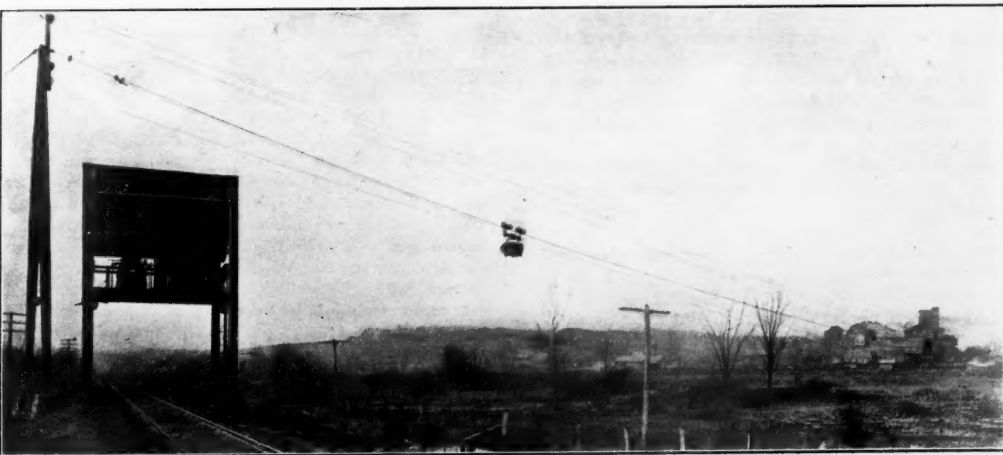


Fig. 2.

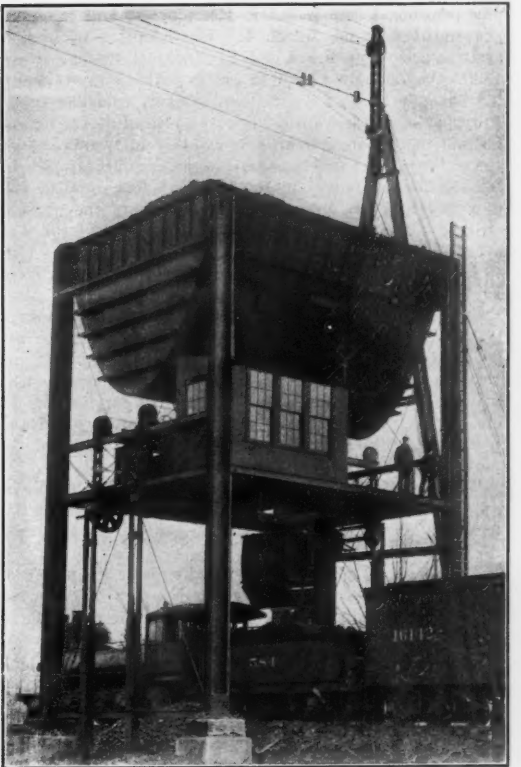


Fig. 3.

### Some New Brown Hoisting and Conveying Machinery.

tirely from its two opposite upper sides. It is built of sheet steel and the lines of the pocket conform very closely to the natural lines of a bag filled with coal and hung up. This gives even tension strains to all of the parts, thereby making very light construction possible, and saving from 50 to 80 per cent. of material over any other form of pocket.

Another novel feature of this plant is the way in which coal is delivered to the locomotive. Fig. 3 shows an empty tub rising after dumping its load on a tender. These tubs are steel, of box form, with two bottom doors hinged at opposite sides, which open after the tub has descended to a fixed point, dumping the coal at a central point on tender, the position of the doors when open preventing spilling of the coal. The tubs are overcounterweighted when empty, the counterweight pulling them back into position to be filled again. The filled tubs being heavier than the counterweight, descend slowly under perfect control of the attendant when he releases them by pulling on a pendant hand-chain. It will be seen, therefore, that by simply pulling on this hand-chain and releasing the tubs, they descend, dump, return, and

time to make any observations on the merits or demerits of per diem; but inasmuch as it is claimed by reliable authority that railroads owning 75 per cent. of the mileage and 80 per cent. of the cars of the United States, Canada and Mexico are in favor of per diem as a basis of settlement for the use of freight equipment and in view of the probable adoption of per diem in the near future some suggestions will be offered. But the first need is that all privileges and concessions made to shippers or consignees, now constituting the principal causes of delay to cars in process of loading or unloading beyond the usual free time of 48 hours be abolished; this is a necessary preliminary to the successful operation of the per diem plan.

Per diem is the only equitable method of settling car service accounts, but it is a mistake to say that it will successfully remove all the evils that affect the car supply. It will undoubtedly expedite the movement of foreign cars, but foreign cars constitute only a small per cent. of the car supply and unless we devise means for expediting the movement of all cars, per diem will be a disappointment. Therefore the committee strongly

ports will be filed and used for settling accounts at the end of the month. Foreign cars in possession at the close of the month will be carried along until they clear the rails of the possessor, before the per diem due thereon will be settled.

Third: Four days free time will be allowed on all foreign cars handled, whether in switching service or through service. No other exemptions will be allowed except for causes beyond the control of the railroads, which may come under the head of "delays to cars in transit," which railroads are chargeable with but not responsible for. Privileges and concessions granted to shippers and consignees will not come under this head.

Fourth: American Association Rule No. 5 will apply—"Cars shall be considered as having been delivered when placed upon the track agreed upon, accompanied by proper data, and accepted by the car inspector," etc.

Fifth: Per diem will be computed from day to day and will include the day of receipt but not the day of delivery.

Sixth: Four days free time will be allowed on each

and every car; this to be deducted from total number of days due. The total number of cars that have cleared the reporting line during the current month having been ascertained and multiplied by four, the result will be deducted from the total number of days due.

Seventh: Per diem to apply as between railroads, because car interchange is reciprocal. Private cars should be kept on a mileage basis, as now.

Eighth: The rate per diem shall be 25 cents per car. Ninth: Per diem will cease on cars destroyed, from date of notice to owners. . . .

Tenth: Per diem will not be paid on cars in shops awaiting material for repairs requisitioned from owners. Such cases, however, should be settled between interested parties if possible and not referred to the Arbitration Committee.

Eleventh: An Arbitration Committee to consist of three or five members, to be elected by the International Association of Car Accountants, to serve for a period of three years, will meet every three months, or as often as may be necessary, to arbitrate and pass upon all claims for exemptions from per diem. It will be the duty of this committee to frame rules under which exemptions may be claimed, based on the proposition that if cars are delayed by causes beyond the control of the railroads and under conditions they are powerless to overcome or guard against, the per diem charges paid in such cases may be refunded by direction of the Arbitration Committee. Delays caused by failure to unload or load cars within 48 hours shall not be deemed a cause beyond the control of the railroad. All claims of exemption must be submitted in writing and when the award is made will be refunded by voucher on the authority of the committee, the full membership assenting thereto, but not otherwise.

No member of the Arbitration Committee will be allowed to serve in any case where his company is a claimant, . . . a substitute being elected by the majority. A full attendance of the committee only will constitute a quorum for the transaction of business. Should the Arbitration Committee fail to agree on any case, they must refer it to the American Railway Association for decision.

Pensions on the Lackawanna.

The Delaware, Lackawanna & Western has decided to pay pensions to superannuated employees, and the plan goes into effect on March 1. The adoption of such a system has been urged by President Truesdale since 1899. Any employee engaged for 25 years in any capacity in the operation of the railroad proper, who has faithfully performed his duties, is to be retired at the age of 65 and to receive thereafter a monthly allowance, as on the other roads which pay pensions. For example, if, for the last 10 years, his monthly pay has equalled \$60 a month and his term of service 30 years the pension will be \$18 a month, equal to 1 per cent. a year (30 years) on \$60.

All employees 65 years old and over will be considered as having attained the maximum age limit for active service and will be retired on pension if they have served 25 years or more, while those whose ages range from 60 to 64 years, inclusive, and who, in the opinion of the Pension Board, have become physically or otherwise permanently incapacitated after 25 years of service may be either voluntarily or by decision of the Board retired and pensioned. The Board has power to pension injured employees and fix the period of payment.

The fund from which payments will be made will be appropriated each year by the company. For the remainder of 1902 an appropriation of \$50,000 has been made.

The board of officers who will administer the affairs of the pension department, under the direction of the president of the company, are General Superintendent T. E. Clarke, General Auditor O. C. Post, Chief Engineer W. K. McFarlin, Superintendent of Motive Power and Machinery T. S. Lloyd, and Traffic Manager B. D. Caldwell. Mr. Caldwell is Chairman and Mr. Post Secretary.

In connection with this announcement it will be of interest to recall the principal features of the pension systems of the other American railroads which have lately established such departments. These roads are shown in the accompanying table. The Pennsylvania was the first one to introduce compulsory retirement at a certain age; and the Lackawanna is the first to fix this age limit below 70 years. The Lackawanna announce-

ments of the department. On the Grand Trunk the Pension Department is supported jointly, half by the company and half by the employees. Only officers, station men and clerical employees participate in the pension fund. The first appropriation made by the Illinois Central (a) included a permanent fund of \$250,000, besides the \$100,000; whether or not any part of the principal of this larger sum is to be used for payments does not appear. On this road new men (c) may be taken into the service as old as 45 years, provided they are experienced in the work which they are to perform.

On the Chicago & North Western an employee, to receive a pension, must have been in the service 20 years; on the Lackawanna, 25 years; and on the Illinois Central, 10; on the Pennsylvania there is no limit in this respect, except that employees are not be pensioned under the 65-year limit unless they have served 30 years. On the Illinois Central outdoor employees may be retired at 65 years; all employees may be at 60 years if incapacitated; all must be retired at 70 without regard to whether or not they have served long enough to receive a pension.

On all of the roads named, except the Grand Trunk, the basis on which pensions are computed is the same as that on the Lackawanna, above described, the salary factor in each case being the average of the man's income in each of the 10 years preceding retirement. On the Baltimore & Ohio the pension fund is supported mainly or wholly by the employees; on the Grand Trunk each man pays 2 1/2 per cent. of his salary, the company putting in an equal amount; and the pension is 1 1/2 per cent. of the man's salary, multiplied by the number of years that he has contributed to the pension fund.

Vibration on the Central London Railway.

A little more than a year ago the Board of Trade appointed a committee to report on vibration appearing in buildings adjacent to the Central London Railway, caused by the working of the traffic over that line. This committee was made up of Lord Rayleigh, Sir John Wolfe Barry and Prof. Ewing. The report of this committee was published last month and extracts from it appear below. As the reader doubtless remembers, the Central London is a deep tube railroad known, locally, as the Twopenny Tube, and it lies at depths varying from 70 ft. to 100 ft. below the surface. The magnitude of the vibrations observed and the relation of quantity or magnitude of vibration to depth of tunnel is not indicated in any way in the report.

"The witnesses all deposed as to the annoyance caused by the vibration, and they were of opinion that the shaking was felt most severely when the trains first began to run in the morning, again between 5 and 8 p.m., and the last thing before the traffic stopped at night. This they attributed to the trains being more heavily loaded at such times, an opinion which was not supported by the scientific evidence subsequently obtained by the committee, and they were nearly unanimous in stating that at times exceptionally severe vibrations occurred for which no reason could be assigned. . . .

"As a first step the committee satisfied themselves by personal observation that vibration sufficient to cause serious annoyance is actually felt in many of the houses situated along the course of the railroad. A very little experience further showed that the disturbances due to successive trains are very unequal. In order to ascertain whether the specially severe disturbances could be connected with particular trains, some elaborate observations were instituted in which 10 or 12 observers were stationed in various houses and recorded during the whole of one day the times of passage of the trains and the estimated intensity of the vibrations. A comparison of these records with records made at the stations by other observers of the precise times of starting and arrival of the various trains gave the means of answering the question proposed.

"The results, analyzed by Mr. A. Mallock, who was employed by us for the purpose of conducting the details of our investigation, showed (a) that it was a matter of chance whether a given train caused a slight or a severe vibration; (b) that trains causing a severe vibration in one house were as likely as not to cause only slight vibration in the others; (c) that different rooms in the same house were not similarly affected by the same train. . . .

"In addition, Mr. Mallock made on behalf of the committee a careful study of the nature and extent of the vibration both on the Central London Railway and in adjoining premises, and for the sake of comparison made similar observations on the Waterloo & City Railway.

four axles of the locomotive is eight tons, making 32 tons in all. This construction was adopted in order to obviate the necessity for gearing, and the committee could not but connect the difficulty with the magnitude of this unspring-borne load. This view was in entire accordance with the results of the experiments on the Metropolitan and Metropolitan District Railways to which we have already referred. . . .

"The Railway Company had already ordered two new types of locomotives in which the unspring-borne load would be reduced, and in this direction there was nothing to be done but to await the arrival and trial of the new types. . . .

"The committee were also anxious to examine the effect of a stiffer rail on the Central London Railway itself. But the experiment could not be carried out. The present rail is of the "bridge" pattern, and room could not be found for the greater depth necessary to attain increased stiffness without encroaching too much upon the already narrow margin allowed between the tunnels and the tops of carriages. In the opinion of the committee it is unfortunate that so small a margin was provided.

"According to Mr. Mallock's observations of the air pressure in front of the trains, the power required to propel them is much increased by the closeness of the fit, so that there would have been compensation in this direction for some increased cost in constructing larger tunnels.

"As to the cause of the vibration, the problem here differs materially from one with which it is sometimes confused, i.e., the explanation of the tremors propagated from fast running and imperfectly balanced machinery. In the present case there are no reciprocating parts, and the revolving parts are perfectly balanced. Moreover, the weight borne on the axles of the locomotives, even though unrelieved by springs, will not of itself account for the objectionable vibration. If the tires were perfectly circular and the rails in their natural condition were perfectly straight, and were so supported as to yield everywhere equally to the load as it passed, there would be nothing to cause vibration. When rails are supported on transverse sleepers, vibrations corresponding to the distance between the sleepers are to be expected, and may in some cases be traced; but on the Central London Railway the sleepers are longitudinal. It was thought at first that the rail joints would prove to be an important source of vibration, but Mr. Mallock's records do not bear out this anticipation. Another want of uniformity of support, probably operative to some extent, is due to the flanges by which the lengths of tube are connected. Where the sleeper crosses the flanges, the yielding under load is presumably less than at intermediate places.

From measurements made by Mr. Mallock there is reason to believe that the principal source of disturbance lies in the unevenness of the surface of the rails. As they leave the rolls the rails are usually curved, and the process of straightening by local bending beyond the elastic limit, however skilfully carried out, inevitably leaves a certain waviness. As the unspring-borne part of the load follows the rail over the crests and hollows of the waves, it is subject to vertical accelerations which cause the pressure on the support to become variable. When there are no springs, and the speed is high, a state of things is soon reached in which the pressure on the rail momentarily disappears and the load is on the point of jumping across the hollows. Such part of the load as is carried by suitable springs moves nearly in a horizontal line without following the waviness of the rails, and the pressure on the rails corresponding to it remains nearly uniform and accordingly innocuous. When very high speeds are contemplated it may become a question whether a higher standard in respect of straightness should not be aimed at.

"It appears that the irregular impulses given by uneven rail surfaces have the effect of establishing and maintaining an oscillation of the rails and roadbed, the whole being regarded as an elastic support loaded with those masses which are not carried by springs. This view is borne out by the observed fact that the chief oscillations, as recorded in the tunnels, were found to have about the same frequency when the train producing them was run at various speeds.

"The new locomotives were ready for trial in August and were of two types. In one the locomotive is, as before, distinct from the passenger cars, but gearing is introduced so that the electric machinery is no longer mounted directly upon the driving axles. The unspring-borne load is correspondingly reduced, and amounts to two and one-half tons on each axle as against eight tons on each axle of the old locomotives. This type, of which there are three specimens, is described as the 'geared' locomotive.

"In the other system, known as the 'multiple unit,' or motor-car system, the locomotive is not distinct, but motors are carried at one end of two or more passenger cars. In this case the unspring-borne load on each axle of the truck under the motor is 1 1/2 tons. Some further particulars are set out in the annexed table.

Weights per Axle on the Various Classes of Rolling Stock Referred to in the Report.

	Weight per axle in tons.		
	Un-spring-borne.	Spring-borne.	Total.
Gearless locomotive (total weight, 44 tons) . . . . .	3	8	11
Geared locomotive (total weight, 33 tons) . . . . .	5.75	2.5	8.25
Multiple Unit Train (total weight of Motor Carriage, 20 tons) . . . . .			
Motor axles . . . . .	4.75	1.75	6.5
Other axles . . . . .	2.4	1.1	3.5
Passenger coaches (total weight, 14 tons) . . . . .	2.4	1.1	3.5

PENSIONS ON AMERICAN RAILROADS.					
	Estab-lished.	Age of Retirement.	Approximate Number	Yearly	New
		Compulsory.	employed.	appro- priation.	men, age limit.
Baltimore & Ohio . . . . .	1885	None.	65	218	\$34,800
Chicago & North Western . . . . .	1901	70	65	27,000	200,000 35
Grand Trunk . . . . .	1874	None.	55	.....	.....
Delaware, Lackawanna & Western . . . . .	1902	65	60	.....	50,000 ..
Illinois Central . . . . .	1901	70	60 and 65	30,000	(a) 100,000 35 (c)
Pennsylvania . . . . .	1900	70	65	76,000	300,000 35
Pennsylvania West of Pittsburgh . . . . .	1901	70	65	35,000	300 35

ment does not explain what action will be taken in the cases of employees over 65 who have been in the service less than 25 years.

The information in the table is not to be taken as official, though the items are believed to be all substantially correct. On the Baltimore & Ohio only members of the Relief Department have received pensions. The sum shown in the table was the actual amount paid in one recent year. The plan or method on which pensions are paid on this road is not very clearly described in the pub-

the Metropolitan Railway, and a portion of the Great Western Railway where bridge rails similar to those used on the Central London Railway are laid down. . . .

"One of the most distinct indications from Mr. Mallock's records was the responsibility of the locomotives, as distinguished from the carriages, for the worst part of the disturbances, and the attention of the Committee was called at an early stage to the excessively large load, unrelieved by springs, carried on each axle of the locomotives. The unspring-borne load carried on each of the



"Observations in the tunnels made by Mr. Mallock for the committee showed, as had been expected, a great improvement. The vibrations in the ground decreased in proportion to the unsprung-borne load; for the geared locomotive they were less than one-third and for the motor car train less than one-fifth of what were caused by the ordinary locomotives. Like results were observed in some houses which we had previously visited. . . .

"The first observations of this kind were made at Mr. Hoghton's house on the 28th of November. During some two hours every train either way drawn by an ordinary locomotive (geared) was distinctly felt, while of the trains drawn by geared locomotives or by motor carriages not one was felt. This result was eminently satisfactory so far as it went; but we were desirous if possible of distinguishing the effects of the two new types, and it was for this purpose that further observations were made at Mr. Pike's house, where former experience had shown the disturbances to be very intense. The difference between the old and the new types was maintained, but it became possible to discriminate to some extent between the two new types. The passages of the geared locomotives were felt slightly in several cases, but in no case was the motor car train perceived.

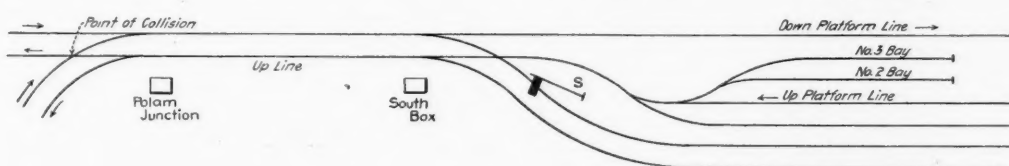
"In view of these results we have no hesitation in recommending the adoption of a type of locomotive or motor in which the load not carried on springs is reduced as far as possible. . . . In the trials which have been carried out the motor cars were found to have an advantage in freedom from vibration over the geared locomotive. So far as the Central London Railway is concerned, we are confident that by adopting motor cars in place of the original locomotives the vibration produced by the running of trains can be reduced so as to cause no serious annoyance, although it is possible that the sound of the trains may still be detected, especially in the night. We are able to speak positively as to the motor cars, but we have little doubt that any method of driving in which the unsprung-borne load on each axle is reduced to a similarly small quantity might also be used with impunity.

"On the question of the best form of rail and sleeper we have no decisive evidence. We are disposed to prefer a stiffer rail than that in use on the Central London Railway, and we think that in new undertakings sufficient room should be allowed for the introduction of a deeper rail; but we are of opinion that, without altering the permanent way of the Central London Railway, the change of motors which we have recommended will effect a practically complete cure of the disturbances complained of. . . ."

#### A Batch of English Train Accidents.

The British Board of Trade has issued within the past few weeks a number of inspectors' reports on accidents which have an interest for American readers.

On the night of July 20 a collision occurred at Polam Junction, near Darlington, on the North Eastern Railway. The arrangement of roads at this place is apparently as shown on the sketch below.



A Collision Due to Suspension of "Lock-and-Block."

It appears that a long train stood on the up-platform line which had to be shunted into No. 2 Bay. To do this the train had to go considerably past the South Box, and consequently into the Polam section. Owing to the proximity of the two junctions, the starting signal, *s*, is controlled from Polam Junction. The South Box signalman should have offered the train on the block instrument to Polam, and the man there should have accepted it; not only was the train not so offered; it appeared that it was not the practice to do so for such shunting operations; also that the control of the starting signal was rendered of no effect by the Polam signalman keeping his lever normally pulled over so that signal *s* could be worked at any time without the consent of Polam. The consequence was that the train stood on the up line without the knowledge of the Polam Junction man; and when it was found necessary for the train to draw still farther down, the driver crept forward without the consent of the signalman, who, unfortunately, had accepted a train from the branch, and a collision was the result.

We notice one matter that the Board of Trade Inspector does not deal with, and that is why the usual interlocking of junctions was not provided, so as to compel the facing points in the up line to be set for the branch, before the trailing points were set. Had this been done the shunting train would have run forward on to the branch, and the collision would not have occurred.

On Aug. 7 there was another accident on the North Eastern road. This was at Grosmont, when a down passenger train came into collision with three goods wagons and a brake van of an up goods train, which had been placed temporarily on the down line, as there was not room for them in the sidings. The collision was

due to the signalman at Grosmont making several breaches of the block regulations. In the first place it is provided that before a shunting operation is performed that will foul the other road, the signalman must "block back" to the signal box in the rear so as to prevent the signalman at that box sending a train forward on the line that is fouled. This he did not do. After several shunting operations he forgot all about the wagons, and lowered his signals for a passenger train, which came into collision with the wagons. The inspector has nothing to say about the very simple means—the track circuit—which could be used to check errors of this kind.

On Oct. 24 a down goods train was passing through Bowling tunnel on the Lancashire & Yorkshire when it broke in two. The first portion came out of the tunnel, the man in the signal box failed to notice that the tail light was missing, and accepted another goods train; and this train came into collision with the second half of the first train.

On the evening of Nov. 5, during a dense fog, a collision occurred on the Lancashire & Yorkshire at Windsor Bridge No. 3 Box. A train was standing at the up home signal when it was run into by another train, the driver of which had passed five signals, four of which were certainly at danger, and about the fifth there is a doubt as to whether that was not at danger also. The five signals in question were the distant, outer home, inner home, and starting signals at Pendleton (the box in the rear) and the distant signal for Windsor Bridge No. 3. When he passed Pendleton distant, a torpedo was exploded, but the fogman admitted that it was not a good report and none of the trainmen appear to have heard it. At the outer home the fogman was engaged attending to some other duties, and did not show a light to the driver, and, therefore, as no light means "all right" the driver assumed that the signal was "off." At the inner home no fogman is stationed as there is no room to stand, and there was neither torpedo nor hand light there; and that signal was passed at danger. On reaching the starting signal, the driver says it was "off" and in this he is corroborated by the fogman; but the signalman says the lever in his box was back in the frame, and the signal should, therefore, have been at danger. This signal carries the distant for Windsor Bridge, but the driver was justified in passing that, so long as he was prepared to stop at the home signal. There seems to be a doubt, however, as to whether the man was running as cautiously as he might, and the Inspecting Officer condemns him severely. The Inspector might well have reserved some of his censure for other features. For instance, the fogman at Pendleton starting signal had no lamp. The fact that there was no man stationed at the inner home on account of there being no room to stand, suggests a difficulty in torpedo signaling which is as troublesome, no doubt, as those which have lately been talked about in connection with our Fourth avenue tunnel collision.

On Nov. 6 a collision occurred on the London & South Western at Turnham Green during the same fog already referred to. This line is fitted up with "lock and block" instruments, by which the home signal cannot be lowered for a second train to enter the station until the first has left. On the day in question a train entered the station,

but did not start away owing to the signalman having inadvertently kept his starting signal at danger, and owing to the fog he did not discover his error. When a second train approached he found that the home signal lever could not be moved, but he failed to recognize the reason for this, and assumed that the electrical interlocking had failed, and therefore took the release key and unlocked himself; he then lowered the home signal, which allowed the second train to run into the first. The action of the signalman does not pay a very high compliment to the efficiency of the electrical apparatus, and the Inspecting Officer sought to obtain information as to how many times it had failed, but the evidence was contradictory and it appeared that no full record was kept of such failures. This is not by any means the first accident due to the improper use of the release key, and the Board of Trade officer suggests that it may be advisable to place the key in the custody of the station master. Here, again, with an efficient track circuit the mishap could not have occurred. And how was it possible for Turnham Green to send the "train out of section" signal for the first train until it had actually gone? What is "lock and block" good for without this provision?

#### Reported Changes at the Union Station, Chicago.

A report from Chicago announces the expected removal of the Baltimore & Ohio from the Harrison Street Station to the Union Station (Canal street) on March 1. It also mentions certain changes to be made by the Pennsylvania Lines in its freight houses, and as a result of a probable desire for increased passenger facilities, it is thought a new passenger station will be built on the site of the present one. All this seems to be rather prema-

ture. The Union Station is owned by the Pittsburgh, Ft. Wayne & Chicago; Pittsburgh, Cincinnati, Chicago & St. Louis; Chicago, Milwaukee & St. Paul; Chicago, Burlington & Quincy, and the Chicago & Alton, and the consent of each of these roads must be obtained before the B. & O. can be admitted. One of the roads has voted adversely, and, though it is expected to obtain a unanimous consent later on, there is no probability of the arrangement being completed by March 1. That the B. & O. expects to use the Pennsylvania Lines from South Chicago is true, its present route into the city being very roundabout and tedious, and the use of the Pennsylvania Lines' tracks would probably mean a saving in time of 35 or 40 minutes.

As to the changes in the freight houses of the Pennsylvania Lines, this is a question between the railroad and the Trustees of the Sanitary District of Chicago, and in connection with the intended widening of the Chicago River. The freight houses are ranged along the river with a roadway between, and this roadway is very necessary to the handling of the freight business. The plan of the Drainage Trustees is to obtain possession of this strip of land by condemnation proceedings. But there is a State law to the effect that land already set aside for public use cannot be secured by condemnation proceedings for some other purpose, and it is on this ground that the railroad will fight the case.

#### Locomotive Brake-Shoe Tests.

Feb. 21, we gave the results of tests of locomotive driver brake-shoes made on the Chicago, Rock Island & Pacific, which are said to show in a general way that a chilled driver brake-shoe having inserts of crucible steel is about equal in frictional qualities to a similar chilled shoe having inserts of chilled iron; the life of the first shoe in service was reported to be more than three times that of the brake-shoe with chilled iron inserts. In the discussion of these tests before the Western Railway Club several points were raised which were answered by Mr. F. W. Sargent, who was present when the tests were made. A portion of Mr. Sargent's discussion follows:

To settle the question as to the similarity between the "B" shoes supplied for the wearing tests and those furnished for the stopping tests, sample shoes were taken at random and broken longitudinally in order to show up clearly the construction and relative proportions of hard and soft metal in the shoes. The sections are on exhibition in Mr. Stocks' office and show almost identically the same metal and from these fractures it is assumed that the "B" shoes used in the wearing tests are practically the same as those in the stopping tests. One of the "A" shoes of the stopping test has been broken and found to be hard cast-iron with a white iron insert  $\frac{7}{8}$  in. deep. At the time the wearing tests were made no thought had been given to a test with the dynamometer car; the question of stopping efficiency or retarding power only came up when the relative wearing qualities were discussed. . . .

The question has been raised as to the distances run in stopping from 40 and 65 miles an hour, which tends to give the impression that the "A" and "B" shoes are not very good shoes. . . . The paper now under discussion is the latest contribution to the subject of stopping trains. Here we have a ten-wheel engine weighing 51 tons stopped from a speed of 40 miles an hour by the "A" shoes in 1,443 ft. and by the "B" shoe in 1,530 ft. At 65 miles an hour, the "A" shoes made stops in 4,363 ft. and the "B" shoes in 4,188 ft. . . . In 1887, in stopping an engine and dynamometer car with the Westinghouse automatic brake the distance run was 1,457 ft. from 40 miles an hour, and the engine was an eight-wheeler, whereas the Chicago, Rock Island & Pacific engine stopped in 1,443 ft. and it was a heavier, ten-wheel engine. The American brake with engine and dynamometer car, in the '87 tests, stopped from 40 miles an hour in 1,193 ft., but then the engine had wrought iron shoes, which are more efficient than either the "A" or "B" shoes, as wrought iron literally sticks to the steel tire when hot. In 1894, in testing reinforced quick-acting brakes, the Westinghouse Air Brake Co. states that an engine and six-car train using a train pipe pressure of 70 lbs. was stopped in 680 ft. from a speed of 45 miles an hour and in 1,622 ft. at 60 miles an hour, while with 100 lbs. train pipe pressure the same train was stopped in 567 ft. and 1,200 ft. from speeds of 45 and 60 miles an hour, respectively. These records show about the shortest stops that can be made. Last summer on a western road a comparison was made between the "B" type of shoes and a shoe of much less durability and hardness, and stops were made with a ten-wheel engine in 1,437 ft. for the softer shoe from 40 miles an hour, against 1,645 ft. for the harder and more durable shoe; from a speed of 60 miles an hour the two shoes stopped in practically the same distance, 3,250 ft. From these records it would seem that the stops made by the Rock Island engine are not so bad, but if so the record only serves to emphasize the importance of more investigation to bring out better records. . . .

The shoe which shows the highest position in the records of brake-shoe tests presented last year to the M. C. B. Convention is practically the "A" shoe of the paper under discussion. This is the shoe of all the shoes there noted which should make the shortest stops, so far as we may judge from the mean coefficient of friction. Subsequently a second shoe was offered the Rock Island, which differed from the "A" shoe mainly in the character of the insert, the "A" shoe having a chilled or white iron insert



and the "B" shoe had a crucible cast-steel insert. Both inserts presented well defined cutting edges and in the normal state when the brakes were applied there was apparently no difference in the two shoes; the cutting edges were then of the same extent in each shoe, and the cutting effect was the same. Chilled cast-iron, however, loses its hardness when heated, while cast steel of the proper composition does not lose its hardness, and the difference between the "A" and "B" shoes begins when heating takes place. With the former the chilled insert softens and loses its cutting edge when heated and the wear increases, whereas the latter insert, of self-hardening steel, holds its hardness and maintains its cutting edge. In one case the insert suffers and allows the shoe to wear out and in the other the hard insert causes the wheel to wear and prolongs the life of the shoe, maintaining the friction by the action on the wheel face.

Somebody may say there is not enough heat generated to soften chilled iron, but I know of brake-shoes carrying a heavy chill which failed in durability when used in overland runs where there were long applications of the brakes on heavy grades. On local runs the same shoes were reported as being much too hard and not holding the trains, on these runs the shoes being very durable. . . . It may happen that the friction may be much reduced by the softening of the shoe metal by heat. In the case of the tests between the "A" and "B" shoes I believe that the durability of the latter was due to the hardness of the steel inserts over that of the chilled inserts of the former shoe, which being softened by heat wore more rapidly, although the friction may have been held up by the soft insert.

I believe it is fair to compare the fractures of the "B" shoes used in the wearing test with fractures of the "B" shoes used in the stopping test, to prove that there was practically no difference in the "B" shoes. A difference sufficient to condemn the records would be indicated in the difference of the fractures, and as the fractures were practically identical it is fair to assume the shoes were uniform. The "B" shoes were certainly made for test, while the "A" shoes were taken from the storehouse stock.

#### The Leighton & Howard Steel Company.

In 1867 Messrs. Shickle and Harrison established a business which was incorporated in 1881 as the Shickle, Harrison & Howard Iron Company, of St. Louis, for the manufacture of structural iron and cast-iron gas and water pipe. About two and a half years ago they began to build a large modern cast-steel plant at East St. Louis, Ill., on a site which practically puts them on every railroad line entering East St. Louis. Their old plant was in St. Louis, opposite the Union Station. This ground is valuable, and is still owned by this corporation, but they have ceased to make anything but cast steel as their entire output.

The plant at East St. Louis was designed for the manufacture of cast-steel trucks and body bolsters and railroad specialties. Therefore, the words "Iron Company" are misleading. Then, again, as the company is about to enter different lines, and has recently been organized on a much larger scale, and as none of the old firm have now any interest in the company, the new organization has taken the name of the young men in charge, and is known as the Leighton & Howard Steel Company, and the gentlemen controlling and operating this company are Messrs. George B. Leighton and Clarence H. Howard.

Mr. Leighton was formerly President of the Los Angeles Terminal Railway, and took an active interest in the American Railway Association, and is connected with many St. Louis institutions. He is the son of the late Mr. Geo. E. Leighton, who was government director of the Union Pacific Railroad, and for many years connected with the Missouri Pacific and the Kansas Pacific; was for 20 years President of the Washington University, was one of St. Louis' most prominent lawyers, and a very public-spirited man.

Mr. Howard started as a machinist's apprentice on the Union Pacific under Mr. J. H. McConnell, for many years at the head of the mechanical department of the Union Pacific and now Manager for the American Locomotive Company, Pittsburgh Works. Mr. Howard subsequently graduated from the Manual Training Department of the Washington University, St. Louis, and was made foreman of the Missouri Pacific shops, and afterward General Foreman and Assistant Master Mechanic; then appointed Superintendent of the Missouri Car & Foundry Co. works at Cambridge City, Ind., afterwards moved this plant and erected a new plant at Birmingham, Mo., a suburb of Kansas City, known as the Kansas City Car & Foundry Company, after which he was made General Manager of the Car Seat Department of the Scarritt Furniture Company; from there was appointed Assistant General Manager of the St. Charles Car Company, and for eight years he was Secretary and General Western Manager of the Safety Car Heating & Lighting Co. (Pintch system). About two years ago he bought a large interest in and was elected Vice-President of the Shickle, Harrison & Howard Iron Company.

The company has increased its capacity in the last eight months very much, to about 100 tons per day of finished castings. It employs about 1,400 men. Mr. J. C. Davis, who was connected with the Sargent Company at Chicago, is manager of the plant.

By careful laboratory research, physical tests and the use of the microscope they have been able to bring their metal to a high standard, and have recently got

some fine tests. One test made during the last month shows 92,000 lbs. tensile strength, 24 per cent. elongation and 38 per cent. reduction—a remarkable specimen of open-hearth basic steel.

#### The Gregg Portable Track.

The accompanying cuts show the Gregg system of portable track which has been used successfully for some time past in Hawaii and various parts of the United States. Fig. 1 is a top, and Fig. 2 a bottom view of a section of the tie, showing method of holding the rail; Fig. 3 represents the clip and pin shown in Fig. 2. The rails are supported at joints by splice shoes of special design, requiring but one bolt, the opposite rail being held in place by the natural spring of the shoe (see Fig. 4). As no bolting or unbolting is necessary, the sections of track can be put together or taken apart as fast as they can be handled. The ties are of steel and the clips, pin grips and splice shoes of malleable iron. Unlike other port-



Fig. 1.

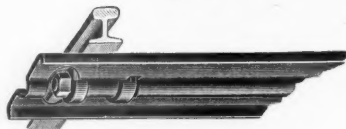


Fig. 2.



Fig. 3.

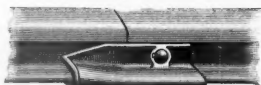


Fig. 4.

able track where the tie is bored to receive a retaining bolt, the Gregg track has no parts subject to wear from movement of the rail. The track is now being introduced into Cuba, Mexico, South America, and other countries by the American Machinery & Export Co., of New York. It is adapted for use in manufacturing plants, warehouses, sugar plantations, etc.

#### The New York Air Brake in Russia.

Every few months reports are circulated in Wall street giving descriptions of the progress being made by the New York Brake Co. in entering the foreign field. A report of this kind was in circulation this week, it being stated that the "Russian plants of the New York Brake Co. will be operating within a few weeks," and that it "will rank among the most modern in the world, and will have a capacity greater than that of any of the company's plants in this country." A similar statement was published at the beginning of the year, with the addition that the Russian plant of the company was shipping air-brakes to other countries. In order to get at the truth of these reports a banker addressed a letter dated Jan. 17, 1902, to a friend in Moscow, an American, and the following is a copy of the reply, received yesterday:

... Mr. Thomas Purdy appears to be the proprietor of the works. . . . From the best information I have been able to obtain regarding the business done by the New York Co., the only actual sale of brake material made by them to the Russian State Railways was 50 sets, which they sold some years ago when various systems of air-brakes were put on competitive trial by the railway department before they made a selection of a standard brake for use in Russia. The department's choice fell on the Westinghouse brake, which was then made the standard air-brake for the Russian railroads, and which position it retains to the present day. The 50 sets above referred to were imported from America, and the New York Company has not manufactured a single brake in Russia.

"Last October a general order was issued by the Minister of Ways and Communications permitting the few private railroad companies to use two other systems of brakes besides the Westinghouse system on their roads, namely, the Lipkoffsky system and the New York Brake Company's, but these brakes are subject to price and all conditions already in force in regard to the standard Westinghouse brake, and to the further condition that their brakes must be interchangeable with the Westinghouse brakes. This measure, I am informed, was only introduced with the view of bringing about a competition with the Westinghouse Company for the supply of the private railroads, so far as price is concerned, and has not in any way affected the supply of brakes by the Westinghouse Co. to the state railroads in price or otherwise, and as doubtless you already know nearly all the railroads in Russia are owned by the state. The Westinghouse Co. have large works in this country, well equipped with the most modern American machinery, and are at the present time the only people supplying the Russian

government with brakes, or anyone else, with brake apparatus made in this country.

"From inquiries made by me, I am informed that the buildings purchased by Mr. Purdy have no machinery in them, and as I know it took the Westinghouse people years to equip their works and get their workmen trained to make interchangeable brake apparatus, I cannot imagine how Mr. Purdy will be able to supply brake apparatus of the New York system manufactured in Russia for a long time to come, and even the private railroads in Russia are not allowed to buy foreign-made brake apparatus. Therefore, I am quite at a loss to understand how the statement comes to be circulated in America that the New York Company is doing a large and lucrative business in supplying the Russian railroads with air-brakes, etc. This letter is written without prejudice."—*Pittsburgh Chronicle-Telegraph*.

#### Vision, Color Sense and Hearing.

This was the title of a paper which was read by Dr. Charles H. Williams, of Boston, at the February meeting of the Western Railway Club at Chicago. On the general subject of railroad men's eyes, we have quite lately informed our readers, having given last September (page 652) the main points of a report presented to the American Ophthalmological Society, of which Dr. Williams was himself one of the authors. His Chicago address was devoted chiefly to a running commentary on the rules for examination of eyes and ears which are in force on the New York, New Haven & Hartford. Dr. Williams is the professional oculist of that road and he has had much experience in examining railroad men's eyes. One of the main points which he brings out and which, indeed, he has mentioned before, is that the percentage of applicants rejected for deficient vision by any given railroad represents not only a factor of safety in the operation of that road, but a factor of danger in the operation of other roads which do not make examinations; for men rejected on one road find ready employment elsewhere. He says that one Western road—meaning, we suppose, the Burlington—in 12 years rejected 1,888 men for lack of acuteness of vision, and 441 who were defective in color perception. He insists that both the worst test and the lamp test should always be used. With his lantern the light can be so adjusted that it has the effect of a full-sized light 1,500 ft. away, thus detecting cases where the deficient color perception exists only in the central portion of the retina.

Dr. Williams says that all records should be carefully preserved; and he cites a case where a fireman, dismissed for defective color sense, went to another road and was put in charge of an engine; and on his second trip he ran past a red signal, had a collision, and was killed.

The doctor reminded his hearers that normal vision does not mean an extraordinary amount of sight. Many young men can read 20 ft. letters at a distance of 30 ft.; they have 50 per cent. better vision than is required. In the tests on the New Haven road small pictures of semaphores are used, which represent a full-size semaphore half a mile away; these pictures can be correctly read by a person with two-thirds normal vision.

The full report of Dr. Williams' paper contains the New Haven road's rules and the full directions for using the Holmgren test, as approved by a committee of the American Ophthalmological Society in July, 1901. The railroad company's rules contain all needful directions for using the lantern test.

#### Electric Traction on English Railroads and Tramways.

The present position of electric traction matters in Great Britain is of considerably greater interest and importance than at any previous date. In 1895 the overhead trolley system was applied to certain tramways. A number of the larger cities did not favor the overhead trolley wire for their central thoroughfares, and after prolonged investigation the London County Council resolved that for many of the South London lines the slot method was the only permissible thing. Three months ago therefore that body placed with J. G. White & Co. the equipment of 16 miles of center slot type of conduit. About the same time the Bournemouth municipality concluded that for some parts of its attractive town about two miles must be on the side slot system, about 14 miles being equipped with overhead trolley. The equipment will be very similar to that which has been in operation for some time in Paris and other French cities.

But this is not the only important development now taking actual shape in London. The shallow tramway proposal of the Council for connecting the street car services of the north and south of the metropolis is exciting an enormous amount of discussion and criticism among engineers, and in the press generally. All that has been done so far is to prepare applications to Parliament. When the committees sit, in the course of a few months, the whole subject will be threshed out in great detail, and much as greater facilities for London travel are needed, there will be no undue haste in permitting the Council to proceed with actual operations. Promoters of new underground electric lines, whose corns are trod on somewhat by the Council in this matter, are bound to offer great opposition. We have had an opportunity of going into these numerous schemes for additional railroads on the tube principle, and cannot help feeling that the idea is being overdone. We mention briefly the principal schemes which are now on paper:



London United Electric Railways; construction of underground lines from Shepherd's Bush and Hammersmith to Barnes, Charing Cross, Clapham Junction and Marble Arch.

City and Crystal Palace Electric Railway.

Edgware & Hampstead Underground Railway.

City, Wandsworth & Wimbledon Railway.

Charing Cross, Hammersmith & District Company, to construct subways and electric lines from Hammersmith to Barnes, from West Strand to the River Thames, from the Strand to Piccadilly Circus, and from Piccadilly Circus to Hyde Park Corner.

Victoria, Kennington & Greenwich.

East London, City & Peckham (Plaistow to Gracechurch St. and Peckham).

Great Northern & City Electric Railway Co., whose lines are rapidly making progress, proposes to bring its tunnels further cityward from Moorgate St. to Lothbury.

City & North East Suburban Railway. This application is for substituting some lines for others which were included in the former application.

Central London Railway proposals are for bringing a tunnel round from Shepherd's Bush to the Bank, and making the line a circular line which would compete more keenly than ever with the Metropolitan & District lines.

The Piccadilly & City line, working in conjunction with the North East London, has plans for extensions and junctions giving a through route from Hammersmith by way of the Strand, Fleet St., City on to Holloway, Tottenham and Southgate.

The City & Brixton proposition, which has been hoping to come to a head for years, has had to be definitely abandoned, and the empty and unused tunnel which the City & South London Railway Co. had long expected to sell to it for a pretty round sum may remain unused for a good time yet and continue to represent a large amount of sleeping capital sunk under the Thames River.

Brompton & Piccadilly Circus Railway proposes an extension of its tube line to Charing Cross and Walham Green.

King's Road Railway Co. proposes an extension to Putney.

The experience of the Central London Railway during the past year or two is pretty certain to be taken advantage of by engineers of any new lines. The size of the tunnels in regard to whether the trains should be close fitting, whether electric motors or multiple unit control, the manner of permanent way equipment, these and half a dozen other matters are in a state of more or less uncertainty it seems at the present moment. The stoppages, from different causes, in the tunnels, especially so prolonged a block as that which occurred on Dec. 30, do not fill the traveling public with the greatest confidence, especially in presence of the disaster which has occurred through the firing of a train and platforms in the tunnel section of the Liverpool Overhead Railway, when there was a strong wind blowing and seven persons were either burned or suffocated to death. Incidentally, we may remark here that the Board of Trade has held its inquiry into the Liverpool affair, but its report is not yet out. The evidence given, however, showed that the motors employed were "open" motors which had been in the company's service for nine years, ever since the line was opened.

All things considered the City & South London Electric Railway opened 11 years ago and recently extended to Islington in the north of London, has been freer from failure and serious accident than any like railroad in the Kingdom. In some respects it may be open to the charge of moving slowly, but it has a good record of substantial service to show, and now boasts of a length a little greater than that of any other similar line.

The matter of the electrical equipment of the Metropolitan and District lines may now be regarded as definitely arranged. The two companies are settling down amicably together to carry out the electrical conversion on the continuous current system, and the erection of power stations and the manufacture of plant therefor are in hand. It seems that each company wants to erect and equip its own power station, the one at Chelsea and the other at Neasden. Mr. Perks thinks that it would be waste of money for the Metropolitan to spend about £300,000 upon a power house at Neasden, when current could be supplied at a lower rate from Chelsea.

At its Chelsea station the District will have plant equipment of 60,000 kilowatt capacity, providing power not only for the District, but for several other lines which may be worked in close association therewith. Energy will be transmitted from Chelsea to substations, where it will be brought down and converted to 500 volts direct current. The District will run 60 trains with multiple unit equipments. The carriages will be 52 ft. long, and each train will seat 338 passengers. These trains will be so constructed that in the slack hours of the day they will be divisible into two sections and will run in short lengths. There will be a motor car at each end and a car in the middle. The District is working in friendly relations with the London & North Western which, it will be remembered, has running powers over the line from Earl's Court to the Mansion House station, and an arrangement has been entered into with that company to haul forward their trains by an electric motor or engine if the L. & N. W. does not elect to have its own trains hauled by that method.

Reverting to the question of "tube" lines, there is every prospect of these being tried in some of the large provincial cities ere long. There is such a project awaiting Parliamentary approval for Manchester. It is termed the "City Circle" line and would run in a circular direction from Victoria Station. Another project comes from Shields, the scheme being to connect North and South Shields by means of an electric tunnel laid beneath the river. There is also a tube line projected for Birmingham, but whether it will come to anything is quite uncertain at present.

So far as the electrification of the suburban sections or branches of the great trunk lines is concerned, there are many rumors, and some lines have gone so far as to appoint electrical experts to advise them on the subject. The fact that heavy operating expenses during recent years have made shareholders and investors organize themselves to clamor for the adoption of electric traction as a means of economy, has perhaps been in a measure responsible for this.

London, Jan. 1.

#### The Cambridge Bridge.\*

Few people realize that there is now being built across the Charles River (Boston) a bridge which will be not only one of the finest structures of its kind in this country, but will be a rival of any in the old world. It is of particular interest as marking another step in advance in the recognition by municipal authorities of aesthetic considerations in the design of public works. The new bridge replaces the old West Boston Bridge, a wooden structure first built in 1792-93. In 1898, the Legislature authorized the construction of the bridge by a commission consisting of the Mayors of Boston and Cambridge, and a third permanent member, who is expected to serve throughout the life of the Commission. Mr. E. D. Leavitt was chosen as third commissioner.

The Charles River is unique among American rivers owing to the fact that its banks for more than 20 miles are public reservations. The river broadens at the lower end of this park system into a beautiful basin, which will be crossed by the new Cambridge bridge, and the day is probably not far distant when the Charles will become one of the best water parks of the world. It is for this reason that it was determined at the outset that the bridge should be of a dignified and monumental character.

The Commission organized in the spring of 1898, and

traced controversy with the War Department, the adverse decision of which was finally overruled by Congress, the Cambridge Bridge Commission, at the end of the second year of its existence, was able to proceed with the final plans for the bridge.

The length of bridge between abutments will be 1,767½ ft., comprising 11 spans of steel arches of 12 ribs each, with spans varying from 101½ to 188½ ft. The height of the bridge at the center is to be 48½ ft. above low water, which gives, in the center span, the 26 ft. of head-room at high water required by the Acts of Congress and the State Legislature.

One of the most striking features of the design for the bridge is the great size of the two central piers, beside which the largest piers of the Charlestown and Harvard Bridges appear insignificant. The foundations of these two central piers are each 201 ft. long by 67 ft. wide; the total height from the bottom of the piles to the surface of the roadway, 100 ft. These center piers will have at each end ornamental stone towers 40 ft. high above the roadway, and smaller stone towers will be placed at the ends of each bridge abutment.

The bridge will be 105 ft. wide between railings, making provision for four lines of car track, flanked on either side by a broad roadway and sidewalk. The two central tracks will be fenced in for the Boston Elevated Railway trains, which, like the surface cars, are to cross the bridge at the level of the roadway.

The work will require 80,000 cu. yds. of dredging, 85,000 cu. yds. of Portland cement concrete, 20,000 cu. yds. of granite, 25,000 piles, 150,000 bbls. of cement, and 8,000 tons of steel. These quantities are for the bridge only, and are exclusive of those required for its approaches. The work of preparing foundations was begun in July, 1900, under contract with Holbrook, Cabot & Daly. James W. Rollins, Jr., a member of the firm, has immediate charge of the work for the contractors. Piles



The New Cambridge Bridge at Boston.

appointed William Jackson Chief Engineer, and John E. Cheney First Assistant Engineer. Mr. Jackson and Mr. Cheney are respectively City Engineer and Assistant City Engineer of Boston, and the latter is well known as a bridge engineer. Associated with them is Edmund M. Wheelwright, a Boston architect.

The old West Boston Bridge had a draw which would allow the passage of any vessel of such size as could ascend the river. The earlier studies for the new bridge were made with the idea of using a draw; and several of the preliminary designs were for a bridge of stone or steel arches with a central draw channel running through an artificial island, the latter being of structural use to resist the thrust of the arches of each half of the bridge, and available also for park purposes. These designs furnished many architectural possibilities; but it was felt that a draw of any description would not add to, but would rather detract from the beauty of the bridge.

The Massachusetts Legislature in 1899 authorized the Commission, with the consent of the United States Government, to build the bridge without a draw, provided it crossed the channel at a height sufficient to furnish a clear head-room of 26 ft. above mean high water. In the summer of 1899, however, matters were seemingly brought to a standstill by the action of the Secretary of War in disapproving both the proposed island in the river and the drawless bridge project. The objection to the island was that it would interfere with the tidal flow, and it was held that a drawless bridge would be an unreasonable obstruction to navigation. The Massachusetts delegation in Congress was appealed to; and eventually a bill authorizing the Cambridge Bridge Commission "to construct a drawless bridge across the Charles River in the State of Massachusetts between the cities of Boston and Cambridge," passed both houses of Congress, and received President McKinley's approval the following month. Thus, after securing legislation by three successive State Legislatures, with concurrent action by the city governments of Boston and Cambridge, after complying with all requirements of State authorities, after numerous and lengthy hearings, and after a pro-

were driven for the foundation, by a very heavy steam hammer and follower, to a depth of from 30 to 75 ft. below low water, into gravel and hard pan. The piles are of spruce from 20 to 50 ft. long. They were driven in two sets, one being 2 ft. higher than the other. After the first set was driven about 3 ft. on centers, they were sawed off at the proper elevation by a circular saw mounted on a vertical shaft 60 ft. long, which was driven from the deck of a scow by a belt, and so arranged that the saw could be set at any depth down to 40 ft. under water. The second set of piles was then driven, and sawed off 2 ft. above the first. A coffer dam of 6-in. tongued and grooved yellow pine timber was then driven around the pier, the timber being generally 40 ft. in length. In this and upon the top of the piles was deposited the concrete made of Portland cement, sand, and gravel mixed in the proportion of 1:2:4, deposited through a tube under water up to an elevation of 6 ft. below low water. The coffer dam was then heavily braced, caulked up, and pumped out by centrifugal pumps, two of which could discharge 20,000 to 25,000 gals. of water per minute, or over 1,000,000 gals. per hour. The rest of the work was then done in the open air with the dams free from water.

The top of the concrete foundation is at an elevation 5 ft. below low water, and from that elevation the pier has a facing of heavy granite backed with concrete. The ten piers are already about two-thirds completed, and work will soon begin upon the abutments. Upon these piers and abutments will be carried the steel arches and superstructure, covered by a heavy paved floor. Final plans for the superstructure, are now being prepared substantially along the lines indicated by the illustration.

The bridge will probably be opened to travel two years hence. Its cost is estimated at about \$2,500,000, to be borne equally by the City of Boston and the City of Cambridge. The bridge act provides, however, that the Boston Elevated Railway Company "shall pay toward the construction of said bridge such portion thereof as shall be rendered necessary by reason of its being of additional size and strength for the use of the elevated railroad." The amount to be paid by the railroad company is to be determined by a commission appointed for the purpose.

\*Extracts from an article in the *Technology Review* for January.





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#### EDITORIAL ANNOUNCEMENTS.

**CONTRIBUTIONS**—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

**ADVERTISEMENTS**—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

We offer our hearty congratulations and best wishes for the future to Messrs. Burnham, Williams & Co., better known as the Baldwin Locomotive Works, on the seventy-first birthday of that great concern. The Baldwin Locomotive Works is contemporary with railroads, the first locomotive in their series having been built by Mr. Matthias W. Baldwin, in 1831 and 1832, for the Philadelphia, Germantown & Norristown Railroad Co. This month the works have turned out locomotive No. 20,000. From the primitive blacksmith and machine shops of Mr. Baldwin the establishment has developed into 33 buildings, covering 16 acres of ground, and employing 11,000 men, with a capacity of 1,500 locomotives a year. The history of the Baldwin Works has been repeatedly printed and we need not go into particulars here. The present state of these Works is famous in all the world, and needs no advertisement from us. We congratulate the proprietors and officers of the Works on the way in which they are perpetuating the enterprise and skill of their predecessors, and hope that they will have worthy successors for many generations to come.

On another page will be found the report of the British Board of Trade Committee on the matter of the vibration caused by working the Central London deep tube railroad. This will be interesting to many railroad men who have to do with track and motive power, apart from those who are concerned specifically with tunnel railroads in cities. The vibration has been annoying, not to say alarming, and its severity and extent long ago became the subject of investigation. The eminent gentlemen who now report on it say that the principal cause is, in their opinion, the uneven surface of the rail due to imperfect straightening in the mills. A second cause, but still an important one, is the large amount of locomotive load carried below the springs. The vibrations set up by the multiple-unit motor trains were much less than those set up by the electric locomotives carrying very heavy loads below the springs.

#### The Case of the Northern Securities Company.

The decision just handed down by the United States Supreme Court is of such negative character as may give hope to the partisans as well as to the opponents of the Northern Securities Company. The actual matter decided is a point in favor of the company, but the opinion of the Court will naturally suggest grave apprehension of future trouble in the minds of the gentlemen interested in maintaining the integrity of the company, as to their ability to do so, when it is attacked on more tenable grounds than have been occupied by the State of Minnesota in its proceedings before the Supreme Court.

It is to be remembered that the main jurisdiction of the Supreme Court of the United States is appellate, and is usually exercised in reviewing the

judgments of inferior tribunals. But it has also an original jurisdiction to be exercised when a proper case is made at the instance of complainants who come before it in the first instance for relief, without taking the more usual course of applying first to lower courts. Whenever a State is one of the litigants in a certain class of cases it has the right to bring its suit in the Supreme Court of the United States.

It is to this original jurisdiction, infrequently exercised, that the State of Minnesota has just appealed in its complaint against the Securities Company. In order to understand the status of the litigation and the effect of the decision just made, it is necessary to consider the situation of the litigants, the nature of this jurisdiction and the proceedings sought to invoke it.

The laws of Minnesota prohibit the consolidation of parallel and competing railroads. The Northern Securities Company was organized under the laws of New Jersey for the purpose of owning and controlling a majority of the stock of the Northern Pacific and the Great Northern Railroads, and this purpose has been so far accomplished that the Securities Company now owns the majority of the stock, and is in control and possession of both these railroads. It will thus be seen that a substantial consolidation of these railroads has been effected, the laws of Minnesota to the contrary notwithstanding. And this result has been brought about by invoking the aid of the State of New Jersey, which allows corporations to be created for the purpose of owning and dealing in the stock of other corporations. The charter of the Securities Company specifically authorizes it to purchase, own and sell stock of other corporations, and in giving the company the right to be a stockholder, it also seems to grant by necessary implication all the rights incident to stockholding, which of course, include the right to control the corporation when a majority of its stock is acquired. It may be, and it probably is, a question whether even the liberal laws of New Jersey contemplated the extent of the use, or the result, of the privileges thus conferred. It may indeed be contended with force that under the laws of New Jersey itself, the Securities Company organized as an ordinary business corporation cannot by acquiring a majority of the stock of a railroad company, become itself in effect a railroad corporation, while being freed from the limitation to which it would be obliged to submit, if organized under the railroad laws of that State.

Indeed it may be regarded as a settled principle in the interpretation of corporate laws in all the States that corporations intended to enjoy public franchises under special statutes cannot be organized under general statutes providing for ordinary business or commercial corporations not subject to such special limitations. And if the New Jersey statute purporting to authorize the incorporation of a private commercial corporation merely, is employed to create a corporation owning and operating railroads it may be contended that the general language of the act is not to be so construed as to permit the overthrow of the uniform policy of the State in requiring railroads to be organized under special laws and subject to special conditions. But this question must be decided in the first instance by the courts of New Jersey and no doubt in the due course of time it will be presented for decision.

What the State of Minnesota complains of is, that while New Jersey may make any laws she sees fit for her own State, the operation of those laws must be confined to her territorial limits, and they cannot have such force beyond those limits as to overthrow the laws of Minnesota within the territory of Minnesota. This principle commends itself to common sense and seems to be well settled in the jurisprudence of all the States. The question is not as to the existence of the principle, but as to the occasion when it is invaded and as to the remedy for that invasion.

In the estimation of the Government of Minnesota as well as several other neighboring States, the Northern Securities Company had for its object the substantial consolidation of the Great Northern and the Northern Pacific, and in acquiring the majority of the stock of these railroads, that result was accomplished. After consultation with neighboring Governors, the executive of Minnesota determined to apply to the Supreme Court of the United States under that provision of the Constitution which gives that court original jurisdiction to entertain in the first instance a suit wherein a State is a party. Accordingly an action in equity was proposed wherein the State of Minnesota was plaintiff and the Northern Securities Company was defendant, to enjoin the merging of the Northern Pacific and the Great Northern Companies, and a motion was made in the

Supreme Court for leave to file such a bill in equity. It was this motion made on Jan. 7 that was denied on Monday of this week by the court, Justice Shiras delivering the opinion.

It is quite apparent that in so deciding the Court does not go into the real merits of the controversy.

The Court holds in effect that there is such a defect of parties whose interests would be seriously affected by the action, that a court of equity would not entertain the bill, until those parties were brought into court. The only defendant in the proposed bill is the Northern Securities Company. The Court holds that any action against this defendant would necessarily affect the rights of the railroad companies, and that while the State should have an opportunity to show that the combination was illegal, the railroad companies also, as distinct corporate entities, should have an opportunity to show that it was legal. The Court therefore finds that according to well settled principles of equitable jurisdiction it could not entertain the bill until these new parties were brought in.

But here the Court finds a new insuperable difficulty, which, however, is technical and goes not to the merits of the case. While conceding that it is the practice of courts of equity to grant leave to the complainant to amend his bill by bringing in those parties whose presence in the litigation is necessary to do justice, yet it will not do so in cases where it appears that the Court, for one reason or another, cannot acquire in the end, jurisdiction over such necessary parties. The Court finds and decides that its constitutional jurisdiction would not extend to the case in the railroad companies were made parties defendant, and it therefore refuses to proceed further, on the ground, not that the plaintiff is not entitled to relief, but that the Supreme Court in its original jurisdiction is not competent to grant that relief. The parties are thus remitted to other remedies, or to other courts, as they may be advised. The battle is thus a drawn one, but if it be in a technical sense a victory for the Securities Company, a few more victories like this will render its stock much more available for speculation than for conservative investment.

It is not yet announced what steps the State of Minnesota will next take to enforce its views of the matter. The controversy shifts to another scene, where the assaulting power has more prestige and greater resources.

At the instance of the President, the Attorney-General of the United States has studied the question, and in an opinion recently announced, states that the Northern Securities Company exists in violation of the Sherman Anti-Trust Law, and it is his purpose as soon as practicable, to institute proceedings against the Company under this Act. This action will probably be brought in the United States Circuit Court for Minnesota. This new phase of the question is presented and the troubles of the Northern Securities Company seem just to begin. The Sherman Law, passed in 1890, makes it a misdemeanor to monopolize or attempt to monopolize any part of the trade or commerce among the several States, and pronounces a fine not exceeding \$5,000, or imprisonment not exceeding one year, or both, as punishments upon conviction of the offense. It also pronounces as illegal, every contract or combination in the form of a trust, or otherwise, or conspiracy, in restraint of trade or commerce, and it gives jurisdiction to the Circuit Courts of the United States to prevent or restrain violations of the act, making it the duty of the several district attorneys of the United States under the direction of the Attorney General, to institute proceedings in equity to prevent or restrain such violations of the law.

It is under this law that the Attorney-General must proceed, and the question will thus be presented, not whether the laws of Minnesota, but whether the laws of the United States, have been violated. The issue between the United States on one side and the Securities Company on the other, is whether the company is a combination to monopolize in part interstate commerce, or whether it is a trust in restraint of trade between the States. If it is neither one nor the other the company will emerge from the contest with victory. If it is one or the other, judgment will be pronounced against the company requiring the surrender of the stock which it holds of these railroads, or at least restraining it from exercising its rights as the owner of a majority of the stock. The litigation promises to be a long one, bitterly contested. The questions thus presented to the Court will be novel, not so much from the principles to be applied in solving them as from the facts to which principles now fairly well settled must be applied.

The idea of the Securities Company is a very re-



cent one. If well conceived it opens the way for indefinite combination, not only of corporations of similar purposes, but of corporations of diverse purposes; for if it be lawful for one corporation to purchase any and all sorts of securities without limitation, we can imagine a corporation so vast as to control every other corporation in the country. If the Northern Securities Company can lawfully own a majority of the stock of the Great Northern and the Northern Pacific, we do not see why it may not have the legal power also to gradually acquire control in every other railroad corporation, which it is able to acquire by purchase or otherwise. And if it can acquire railroad stock, we presume it may also acquire the stocks of other corporations, and the limit is difficult to define.

This presents so convenient a scheme for combination that other securities companies have been quickly formed with large capital for the purpose of substantial consolidation. If the policy of the laws of the United States is against this kind of consolidation, we do not see how the Securities Company will come out unscathed from the litigation.

It is impossible to forecast the result. We can only indicate the lines upon which the controversy will proceed.

It seems to be largely a question of primary intent and necessary result of the combination. In the well known Trans-Missouri case the purpose of the contract between the carriers was to restrict competition in rates. This was also the case with the Joint Traffic Association.

The New York Sun, in commenting upon these cases points out that in each instance the restraint of interstate business was the direct and practically the only object of the combination, and it quotes Justice Peckham as holding that the Sherman Act covers transactions "which directly and substantially and not indirectly, remotely, incidentally and collaterally, or as a mere incident to other and innocent purposes, regulate to a greater or less degree commerce among the States." The Sun suggests that the direct object of the Securities Company was the acquisition of the shares of the railroad companies, which is an innocent purpose, and that the result, while it may control to a greater or less degree interstate business, is too indirect and remote to bring the enterprise within the prohibition of the statute. To this we may assent, if there be no purpose in the acquisition of the stock other than holding it for investment. The real purpose, however, of the transaction was to bring under one management the control of both corporations and to operate them so that neither shall compete with the other, but that both may be run for their mutual advantage. This may be and probably is a wise arrangement from a business standpoint, promising profit to those who are interested in the stock of the companies. But that is not the question before the Court. If the necessary and direct effect of the transaction is to monopolize or restrain interstate business the Securities Company is doomed; otherwise, it will flourish to a green old age and blaze the way for many other corporations to follow in its footsteps.

In forecasting the final result we must not lay too much stress upon the weight the Court will give to the economic advantages of combination. The Joint Traffic Association made an excellent case from a business standpoint, but the Court held it was in restraint of trade and paralyzed it by an injunction. The Trans-Missouri Agreement in seeking to prevent a ruinous competition of rates was unobjectionable, economically considered, but the Court held that the very purpose which made the compact most commendable from a business standpoint, made it most obnoxious to the law, and down went the scheme accordingly. The case of the Addyston Pipe and Steel Co. was one of the latest and most notable in which the Supreme Court considered the effect of the Sherman Act. This involved an agreement between a number of cast iron pipe companies to limit competition in the business throughout a number of States and so enhance prices. The Court held the transaction to be in restraint of interstate trade and dissolved the agreement so far as it concerned commerce between the States.

It is to be noted that these cases all involved agreements between different corporations, and did not present the question whether a corporation specially organized to accomplish the same results, with the same effect upon interstate trade, can by reason of the mere fact of incorporation, escape the fate which State laws, individuals and voluntary associations have all suffered at the hands of the Supreme Court.

This question is now presented, perhaps for the first time, by the Securities Company. But it would indeed seem a singular result if, while the State of

New Jersey itself cannot make a law which would override the Sherman Act, it should be held that a creature of its laws could do so. And we opine that if the Supreme Court shall finally be of opinion that the Northern Securities Company is a combination for the purpose of monopolizing or restraining interstate trade, the fact of incorporation will not bring exemption from the common fate that has overwhelmed similar schemes of individuals, associations and States alike.

#### Some Further Experience with Friction Draft Gear.

In the Railroad Gazette of October 11, 1901, we gave a record of the failure of couplers and attachments on the Butte, Anaconda & Pacific Railroad, both on their own 50-ton steel cars, all of which are equipped with the Westinghouse friction draft gear, and on 50-ton steel cars of foreign lines, while in service on the Butte, Anaconda & Pacific, these foreign cars being fitted with double or twin spring draft gear. The published record included six months beginning Nov. 1, 1900. Below this statement is reprinted, and we have added to it the record of the next six months to include the 12 months from Nov. 1, 1900, to Nov. 1, 1901:

	Failures.		Car Mileage.		Ratio of Mileage.
	Foreign.	B. A. & P.	Foreign.	B. A. & P.	
1900.					
Nov. ....	18	0	14,455	149,820	1: 10.3
Dec. ....	20	1	17,183	146,040	1: 8.4 (a)
1901.					
Jan. ....	18	0	22,356	139,800	1: 6.2
Feb. ....	10	0	13,263	97,380	1: 7.3
Mar. ....	13	1	11,637	131,640	1: 11.3 (b)
Apr. ....	11	1	15,535	149,220	1: 9.6
May ....	6	1	24,973	185,597	1: 7.4
June ....	13	4	24,017	176,948	1: 7.3 (c)
July ....	7	0	22,750	147,839	1: 6.4
Aug. ....	5	3	22,854	149,203	1: 6.5
Sept. ....	10	2	23,432	134,408	1: 5.7 (d)
Oct. ....	3	1	17,276	110,732	1: 6.4 (e)
Total..	134	14	229,731	1,718,627	1: 7.5

(a) Three B. A. & P. and three foreign cars had sills damaged in a collision, and two of the latter had couplers broken.

(b) Friction draft gear cylinder found cracked two weeks earlier.

(c) One B. A. & P. coupler with 5-in. shank.

(d) One B. A. & P. coupler with 5-in. shank.

(e) One B. A. & P. coupler with 5-in. shank.

The first six months record was discussed in our former article, and again in our issue of Nov. 29. During the second six months the record shows 11 failures on B. A. & P. cars, viz., nine couplers broken, one cracked, and one knuckle broken. Of broken couplers, three were from cars with 5-inch coupler shanks, there being five cars so equipped on the B. A. & P., all others and all foreign cars having couplers with 6-inch shanks. Of the broken couplers on B. A. & P. cars, five had old cracks, and five, or nearly half the failures on cars equipped with the friction draft gear, were repaired during a period of two weeks, indicating very severe service or an accident. The foreign failures were 17 broken couplers and one cracked; 19 knuckles, two yokes, two followers, two lugs and one spring broken. Three couplers had old cracks.

In the second six months 82,248 car-miles were made to one failure on the Butte, Anaconda & Pacific cars, and 3,075 car-miles to one failure on the foreign cars. A comparison of the second six months on an equal mileage basis gives:

B. A. & P. failures to foreign failures, 1 to 26.7.
B. A. & P. failures to foreign coupler failures, 1 to 12.
B. A. & P. failures to foreign knuckle failures, 1 to 12.7.

For the whole year there were 134 failures on the cars with spring draft gear to 14 with those with friction draft gear; or, on an equal mileage basis, the failures of the spring gears were 72 times as many.

On the spring gear cars, 32 failures of attachments occurred in the year, while none of the friction draft gear attachments failed. In writing of this matter in November, with the first six months record before us we called attention to the fact that the friction draft gears had no broken knuckles or yokes while the spring gears had 30 broken knuckles and 25 yokes. In the round-up for the 12 months we find one broken knuckle on the friction gears and still no broken yokes. On the spring gear cars the 12 months yield 49 broken knuckles and 27 broken yokes and five breakages of followers, lugs and springs. We may for the moment leave the yokes out of consideration, for the yokes on the spring draft gears were of 1-in. x 4-in. iron, while nearly all of those on the friction draft gears were of 1-in. x 4½-in. iron. Still we have 30 broken knuckles against one; or on an equal mileage basis 225 to one. Further, we have the broken followers, lugs and springs. We again ask attention to the bearing of this record on the probable relief of pulling stresses by the friction gear. The figures here collected seem important when analyzed from this standpoint. The number of cars is considerable, the aggregate car mileage is close to two millions, and if the cars

and gears are really comparable these results must be useful, for the service is identical.

The service in which this record was made is severe, but, with the increased use of heavy power, no more severe than will often be met with. The above record has been properly kept and seems to indicate plainly economy in the use of the friction draft gear, considering coupler failures only. The greater saving in fewer train delays, damage to cars, and loss of cars from service cannot be estimated with much accuracy, but must be large.

#### Annual Reports.

*Delaware, Lackawanna & Western.*—The annual report of this company for the year ending Dec. 31, issued this week, records the operations of a year which, in the words of President Truesdale, "will pass into history as one of the most satisfactory, if not the banner year for the anthracite coal interests of this country." The figures "show conclusively that the company enjoys its full share of the business and prosperity with which this particular interest was favored." Coal tonnage mined, bought and handled was much greater than in any previous year in the history of the company. The increased revenues and profits are largely results of the prosperous conditions in the anthracite coal trade, resulting not only from the demand for anthracite, but, as Mr. Truesdale says, because "the marketing of anthracite coal during the past year by the different large interests . . . has been conducted with exceptional good judgment and in the most harmonious spirit." But besides this, an essential factor in the prosperity of the Lackawanna is to be found in the many reforms of management, together with the very extensive and carefully planned reconstruction work which has been going on since the new administration came into power. This promises further increase in profits through decreased cost of transportation, when the benefits of the betterment and the use of the heavy equipment have been further worked out.

In the past year total operating earnings are reported at \$23,507,634, an increase of \$2,619,871, or 12½ per cent, and net earnings, after taxes, are given \$9,122,216, an increase of \$2,856,731, of 4½ per cent. Net income from the coal department operations added \$1,638,600 to this total, and other miscellaneous income brought the available net receipts for charges and dividends up to \$11,202,248, an increase of \$3,095,000. Deduction of charges left \$5,814,000 for dividends on \$26,200,000 stock, or over 22 per cent. Out of this balance, however, only seven per cent was paid, calling for \$1,834,000, but there was appropriated \$2,523,127 as a fund for the renewal and betterment work, which is being carried on so extensive a scale. As various revisions have been made in the classifications of accounts in the past year, the changes shown by comparison of the detailed accounts of 1901 and 1900 in the company's reports, give a not altogether accurate idea of the actual changes in earnings and expenses, and we have taken the liberty, in the following comparisons of the revenue statements for the last two years to present the accounts of 1901 on the same basis as they were reported for 1900. The statements as to the changes in the various items in the company's own report make this possible. The figures follow:

	1901.	1900.	Increase.
Coal earnings.....	\$10,749,344	\$8,305,324	\$2,214,020
Gen'l freight earnings..	7,128,956	6,660,186	468,770
Passenger earnings....	4,669,438	4,168,232	483,206
Total gross earnings...	24,114,957	20,887,767	3,227,194
Transportation expenses.	8,223,784	7,669,491	654,293
Maintenance expenses..	5,708,490	4,879,401	888,089
Total expenses.....	14,361,531	12,776,442	1,585,089
Net earnings.....	9,753,426	8,121,321	1,632,105
Net, less taxes.....	8,980,187	7,252,184	1,728,003
Add misc. income.....	2,080,032	1,842,025	238,007
Total income.....	\$11,060,219	\$9,094,209	\$1,966,010
Charges.....	5,387,854	5,365,011	22,843
Surplus.....	\$5,672,365	\$3,729,198	\$1,943,167
Betterment.....	2,523,127	1,860,062	663,065
Old accounts.....	119,184	12,206	106,948
Dividends.....	1,834,000	1,834,000	.....
Balance.....	\$1,196,054	\$22,870	\$1,173,184

Thus, while the above figures show an increase of \$468,800 in general freight earnings and \$482,000 in passenger receipts, the changes recorded in the company's report in the 1901 account as revised, show an increase of only \$8,500 in general freight and \$366,150 in passenger earnings. Thus also the company's statement shows decrease of \$95,000 in cost of conducting transportation as against the increase of \$654,300 shown above, but the income for dividends in both accounts and all following items work out the same. As regards the decrease in maintenance expenses above it may be pointed out that in 1900, when there was no renewal account, \$986,700 of extraordinary expenditures was included in operating expenses, a further expenditure of \$873,400 for equipment being charged against profit and loss account. These accounts, for the sake of making as accurate comparisons as possible, are set down as a betterment charge in 1900, although that account was not set up until 1901.

While the income account reported above shows gross earnings slightly over \$24,000,000, the figures do not include the gross receipts from coal sales, which if included would have brought total receipts for the year up to \$51,232,000 for the year, showing the stock capital to be turned over twice, in gross revenues, an unusual event in transportation operations. It will be



seen that 70 per cent. of the increase reported in gross earnings was on account of coal tonnage, and the sales of coal also yielded \$7,321,000 more than in the previous year. This latter increase is attributable in part to the higher average price secured for mining in 1901; actual receipts per ton are not given in the report, however. On the other hand, there is a slight decrease in the average ton-mile rate charged on carriage of coal, this being due to a greater proportionate tonnage in the smaller or steam sizes of coal, competing in certain markets with soft coal.

While the traffic statistics show a decrease in the merchandise ton mile rate, this is due to exclusion of certain charges on freight in 1901, and there was an improvement in the actual average rates received. Excluding these items, where changes in accounts vitiate the accuracy of comparison, the following figures will be of interest as showing the increase in the different classes of traffic in the last three years, and in the more economical handling of it. The average revenue freight train load, for instance, increased 47 tons or 14 1-3 per cent in the year, and is now 372 tons as against 303 tons in the last six months of 1899, when these statistics were first compiled by the company:

	1901.	1900.	Increase.
Tons coal .....	7,398,057	6,091,133	1,306,924
Tons merchandise .....	6,460,653	6,390,442	169,911
Passengers carried .....	1,025,996	14,428,880	597,116
Coal 1 mile .....	1,206,818	928,175	278,643
Merchandise 1 mile .....	916,240	956,946	19,294
Passengers 1 mile .....	320,636	282,446	38,190
Average coal haul .....	163	152	9
Average merchandise haul .....	149	150	1
Average passenger haul .....	21 1/2	19 1/2	1 1/2
‡ 000 omitted. † Decrease.			

It should be noted, however, that the rebuilding of bridges for the use of the heavier power is hardly yet completed, and that the new engines and cars have had only limited service on the road, for this and other reasons, so that to a certain extent economies planned for have only begun. The most of the 79 new heavy engines bought in 1901 were not received until late in the year, and the report says the increased service and larger train loads secured since they were put into use contributed little to the year's operating showing. In addition, 65 additional engines have been bought for early delivery, together with 1,600 box cars of 30 tons capacity, and 1,000 pressed steel coal cars of 40 tons capacity.

The report will be found interesting to any one concerned in the working out of modern problems of transportation on a property which, while able to show very large profits under a conservative management, needed virtual reconstruction to place it in a position to be operated economically under present-day conditions. Many details are given of the improvement expenditures undertaken to this end, but only brief mention of them can be made here. During the past two years \$2,022,000 has been expended for new bridge work. It will be necessary to use 22,000 tons additional of steel to bring all the bridges on the main line up to the new standard, at a cost, with the masonry to be rebuilt, of between \$1,500,000 and \$2,000,000. This reconstruction is to be distributed over the next three or four years. Besides \$1,007,255 charged to betterment in 1901, for bridge work \$260,000 was charged into operating expenses.

In 1901, 8,600 tons of 80-lb. rail, in 1900, 15,460 tons and in 1899, 5,574 tons were laid, the company's track mileage on Dec. 1 being 2,211, of which 759 miles were siding and 504 miles of road are double tracked. For new water supply \$100,000 has been spent in the last two years. Forty-four miles of double track and 40 miles of single track were equipped with automatic electric block signals. As a result of the adoption and use of heavy modern engines, it was found necessary to provide stronger turn-tables at every point on the main line where engines are handled, and this necessitated enlargement of roundhouses, coal chutes, and other facilities which have required large and unusual expenditures. With the longer trains handled came the necessity for increased passing track facilities, and a third main track on heavy grades to facilitate movement of heavy slow freight trains over sections where they have been unduly delayed while waiting for trains of a superior class.

Altogether, for betterment work, \$2,523,127 was set aside, as shown by the income account, and this expenditure was divided as follows: Bridges, \$1,007,255; 79 new locomotives, \$1,007,240; 18 passenger and 437 freight and work cars, \$393,926, and car material, \$114,705. A fund of \$321,853 for extraordinary expenditures by the coal department has also been set up.

Still another legal controversy has arisen in the State of Michigan, on account of the repeal of special charters. That of the Detroit, Grand Haven & Milwaukee having been abrogated the railroad commissioner has ordered the company to reduce fares to 2 1/2 cents a mile under the provisions of the general railroad law, but the company demurs. This company was originally organized under special charter as the Detroit and Pontiac, in the year 1834. After several consolidations it was sold under foreclosure in 1878 to the D., G. H. & M. On receipt of notice to reduce fares the company decided to comply with it, and notified the commissioner to that effect, but upon further consideration determined to contest the order in the courts. It is claimed that the earnings of the company above operating expenses have never been enough to pay the interest on its bonds, or a fair

percentage upon the investment, and that there has been a deficit each year, which has been paid by the Grand Trunk; and that the rate is therefore an unreasonable one. It is also claimed that although the charter of the company has been repealed, it has never been re-incorporated under the general railroad law, there being nothing in the repealing act requiring it to do so, and that at the present time it is not operating under any law of the State. Steps have been taken by the State authorities to bring the matter before the court for a determination. It appears that while the company's passenger earnings were, in the year ending with last June, \$2,635 per mile, thus bringing it within the 2 1/2-cent class, its entire earnings were only \$1,039,183, the freight receipts being only a trifle more than the passenger; and the expenses were \$755,699, so that the net earnings were \$115,030 less than the sum required to pay interest on the bonds. Asking the court to take the statute just as it stands, the State can present a plausible argument for the enforcement of the 2 1/2-cent fare; but if the question were to be argued on its merits there would be a fine opportunity to show how the ability of a railroad to carry passengers cheaply often depends on the volume of freight that is offered to it, and on whether it gets good or poor profits on that freight. As the passengers who ride over a railroad are often the same persons who sell or buy or use the merchandise that is carried over the same line, it has come to be considered fair for a railroad to carry passengers for less than a reasonable profit, if only it can get enough profit on freight to make its total net earnings satisfactory; but the people who pay freight bills are not the same ones who buy passenger tickets, and in many cases they do not even remotely represent the same interests; and then the question of justice is not so easily settled. Even if the D., G. H. & M. earned twice as much as it does for carrying freight, and thus could pay its stockholders some dividend, that would not be a conclusive argument for low fares, for the additional freight might consist wholly of flour going from Minneapolis to Liverpool; and the profit on such traffic does not belong to people who ride, for business or pleasure, in Michigan.

#### French Train Speeds and Passenger Cars.

On Jan. 4, in a presidential address before the French Society of Civil Engineers, M. Baudry gave some interesting facts about the increase of speeds in French trains, and also about the change in weight per passenger. A few extracts from that address follow:

"If we begin by comparing the conditions under which travel in 1889 and 1900 on the great French systems was conducted two great differences stand out: We travel quicker and in greater comfort; nor is this true only of the first class and the 'places de luxe' it applies to all three classes equally and in fact the second and third class have gained more perhaps in proportion both in speed and in comfort. To give some idea of the increase in speed I insert for each of the lines leaving Paris the quickest train in 1889 and in 1900; this is only an incomplete list, as many of the trains are the 'trains de luxe,' but the ordinary trains have improved equally.

##### The Quickest Trains.

	Hrs.	Min.
Paris and Calais, 1889.....	4	13
Paris and Calais, 1900.....	3	15
Gain .....	Or 23 per cent.	
Paris and Lille, 1889.....	3	45
Paris and Lille, 1900.....	3	00
Gain .....	Or 20 per cent.	
Paris and Nancy, 1889.....	5	32
Paris and Nancy, 1900.....	4	35
Gain .....	Or 17 per cent.	
Paris and Marseilles, 1889.....	14	19
Paris and Marseilles, 1900.....	11	29
Gain .....	Or 20 per cent.	
Paris to Bordeaux, 1889.....	8	34
Paris to Bordeaux, 1900.....	6	42
Gain .....	Or 22 per cent.	
Paris to Havre, 1889.....	3	54
Paris to Havre, 1900.....	3	00
Gain .....	Or 23 per cent.	
Paris to Rennes, 1889.....	6	58
Paris to Rennes, 1900.....	5	54
Gain .....	Or 15 per cent.	

"This is an average gain of 20 per cent., and before I proceed further allow me to reassure the timid who have been frightened by some interviews on the alleged dangers of high speed and to inform them that the acceleration on the great French systems has not been attained by sacrificing safety but that the opposite effect has been the result.

"First, there is no line which has exceeded the statutory limit of 74 1/2 m.p.h., which limit was in force on several of the lines as early as 1889. It has only been attained, as M. du Bousquet told us in his presidential address in 1894, on falling gradients of a pronounced nature owing to the limited powers of the locomotives. On slight falling grades on the level and on rising grades the speed falls far below this. We have been enabled to reduce the time on the journey by profiting by the increased power of the engines, thereby increasing the speed over the less easy parts of the line.

"The means of increasing the average speed has been that of raising that which was lowest without increasing the maximum. Besides this the time on the journey has been lessened not only because the speed was higher but also as the stops were less frequent and shorter the slowings for junctions have been almost entirely

abolished, thus avoiding a serious cause of delay and the use of extra power from the engine to force the train into speed again.

"For night trains, cars with intercommunicating compartments and corridor cars divide the patronage of the public, but for the day trains corridor cars are the only thing possible, especially when a restaurant car is attached to the train since they allow of the passengers passing into it en route, thanks to the vestibules, which render passage from one car to the other as easy as it is comfortable; in fact, for several years we have built none but corridor cars for the express trains.

"I will now proceed to inform you of the increase in weight which has been brought about by this alteration in the rolling stock of the express trains.

"Our old first class cars with four compartments without any lavatory accommodation weighed 896 lbs. per passenger. Our six-wheeled cars with four first class compartments in pairs and two lavatories weigh 1,187 lbs., an increase of 33 per cent. per seat. Our six-wheeled cars with four first class compartments, a lavatory and a corridor weigh 1,354 lbs., or an increase of 50 per cent. per seat. Our latest type of bogie cars, with 7 compartments, two lavatories and a corridor weigh 1,750 lbs., or 80 per cent. more per seat.

"Besides this increase these weights are based on the cars having the same equipment for lighting and heating as the older ones, though in the new bogie cars the addition of a system of electric lighting and steam heating from the engine increases the dead weight per seat 218 lbs. In the second class the adoption of corridor stock and lavatory accommodation has raised the dead weight from 544 lbs. to 735 lbs. per seat, an increase of 33 per cent. Lastly, in the third class the addition of a lavatory and corridor to afford access to the same has raised the weight from 308 to 456 lbs., an increase of 36 per cent. per seat.

"In addition to these increases there must be added to the day trains the weight of a dining car and its kitchen. These figures show what just cause the general managers had for uneasiness regarding the cost of the comforts and luxuries demanded by the public. I am further fully aware of the fact that the increase in power of our engines has only in a measure kept pace with the increase in loads. But one fact stands out, that without this increase in power and without the great strides made since 1889 by our engines the public to-day would not enjoy the increased speed and comfort which these strides in the last 11 years have made possible."

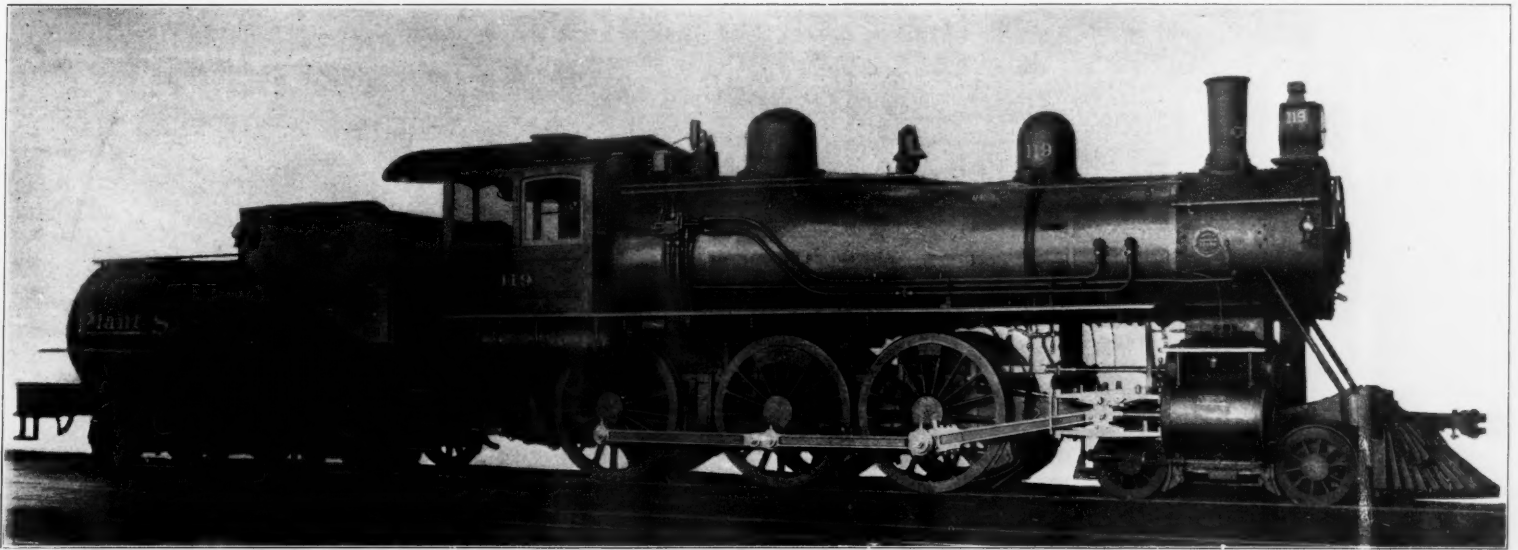
#### The Manchester Ship Canal.

Although it is quite evident that the payment of dividends upon the £8,000,000 of preference and ordinary capital of the Manchester Ship Canal Company is still a matter of the dim and distant future the half-yearly report of the undertaking, issued this week, is of a more encouraging character than many of its predecessors. There was, it is true, a falling off of 21,431 tons in the toll-paying merchandise, taking the sea-borne and barge traffic together; but owing to the increased tolls on merchandise and ship dues decided upon a year ago, the total receipts of the Ship Canal amounted to £163,009, in contrast with £149,484 for the corresponding half of 1900, while the working expenditure fell from £107,135 to £102,980. The balance to the credit of revenue account, therefore, showed an increase of £17,679, or nearly 42 per cent. Unfortunately the Bridgewater Canal results were unsatisfactory, the profits falling from £12,473 to £11,109, so that the net revenue balance was reduced to £71,217. Bankers' and general interest brought up the total available balance to £76,597, comparing with £61,865 for the corresponding half of the preceding year. The improvement of £14,732 enables the directors to pay the half-year's interest on all the bonds held by the public, and to hand over £30,854 to the Manchester Corporation, under the arrangement come to some years ago, by which the Corporation decided to defer its right to payment upon the 4 1/2 per cent. loan of £5,000,000, so as to enable the outside debenture holders to be paid in full.

In respect of the past half year, therefore, the Corporation is still £81,646 short, and the total arrears of interest due to it amount to no less than £1,405,230, out of the balance of £1,449,000 standing to the debit of the net revenue account. Still, the sum of £30,854 handed over to the Corporation is much the largest in any half year since the arrangement came into force, and contrasts with £16,123, £18,494, and £16,270 in the three preceding December half-years respectively.

It is also to a certain extent satisfactory that, despite the falling off in the past half year, the sea-borne traffic carried by the Ship Canal has increased in eight years from 686,000 tons per annum to 2,685,000 tons, though it is quite obvious that the expansion will have to become very much greater if the company is ever to yield any return to the shareholders. As Mr. Marshall Stevens recently pointed out in an address to the Manchester Chamber of Commerce, the Ship Canal has received very much less support from local merchants and manufacturers than was confidently predicted when the enterprise, upon which more than £15,000,000 has been expended, was set on foot, and the task before the directors is to endeavor to enlist the local custom, both as to imports and exports, which has thus far been given so inadequately.—*The Economist*.

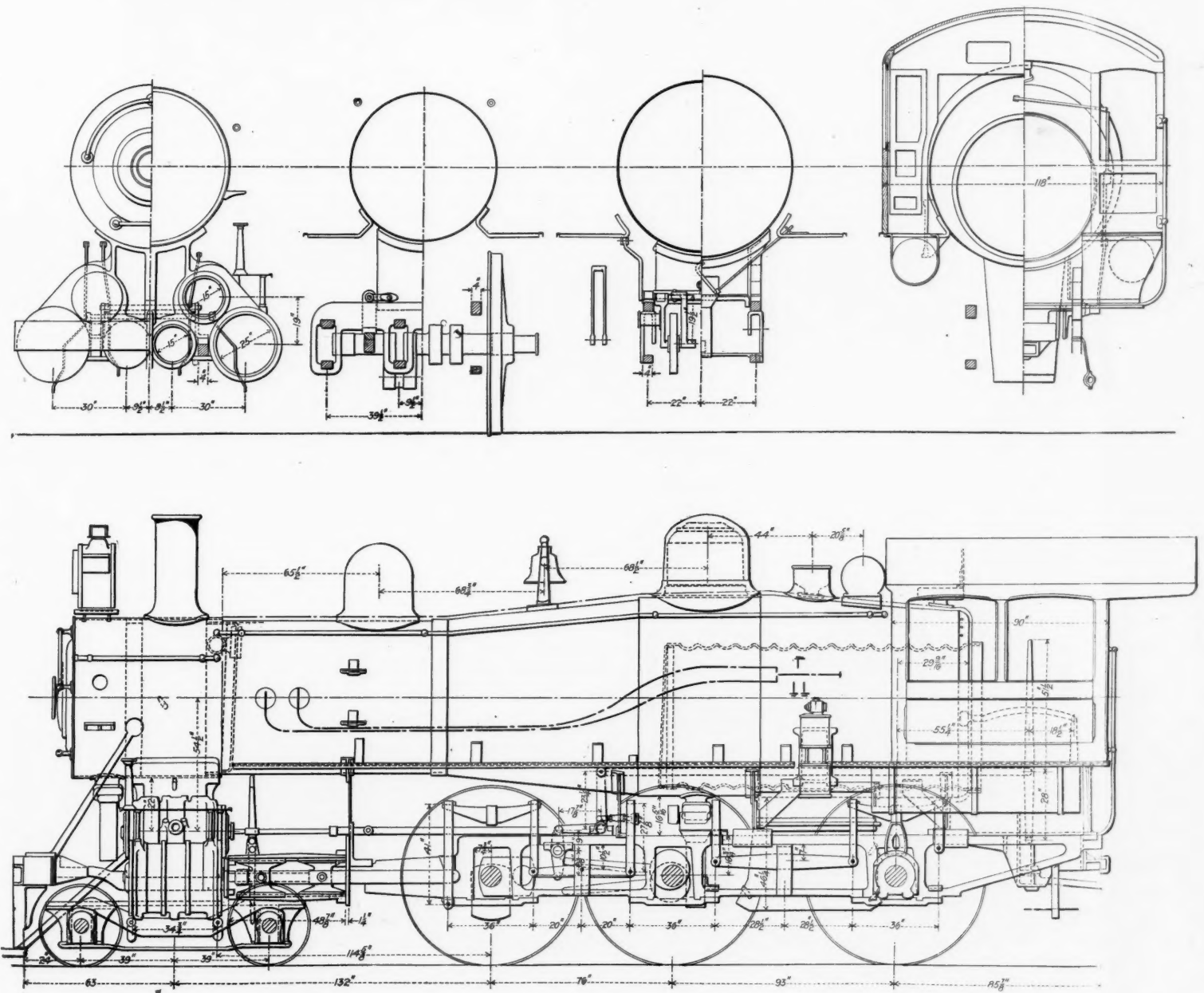




SUMMARY OF GENERAL SPECIFICATIONS.

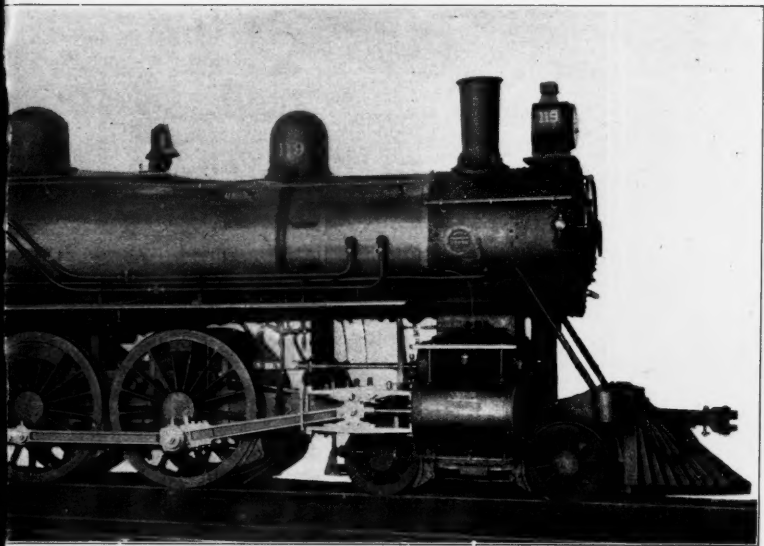
Type.....Four-cylinder, balanced compound  
Cylinders.....15 and 25 x 26 in., new Vaclain  
Valves.....15 in., balanced piston  
Motion.....Stephenson link  
Boiler and tender.....Vanderbilt  
Frames.....Wrought iron  
Driving axles.....Steel  
Driving wheels, steel centers.....73 in. diameter  
Driving wheel-base.....14 ft. 1 in.  
Engine wheel-base.....29 ft. 2 in.  
Total engine and tender.....56 ft. 8 3/4 in.

Working steam pressure.....200 lbs. per sq. in.  
Heating surface, fire-box.....128 sq. ft.  
Heating surface, tubes.....2,665 sq. ft.  
Heating surface, total.....2,793 sq. ft.  
Tubes, 341, steel.....15 ft. long, 2 in. diameter  
Weight on driving wheels.....127,010 lbs.  
Weight on engine truck.....49,500 lbs.  
Weight of engine in working order.....176,510 lbs.  
Total weight of engine and tender.....276,000 lbs.  
Tender capacity.....Coal, 9 tons; water 5,000 gals.  
Tender trucks.....Symons boltless



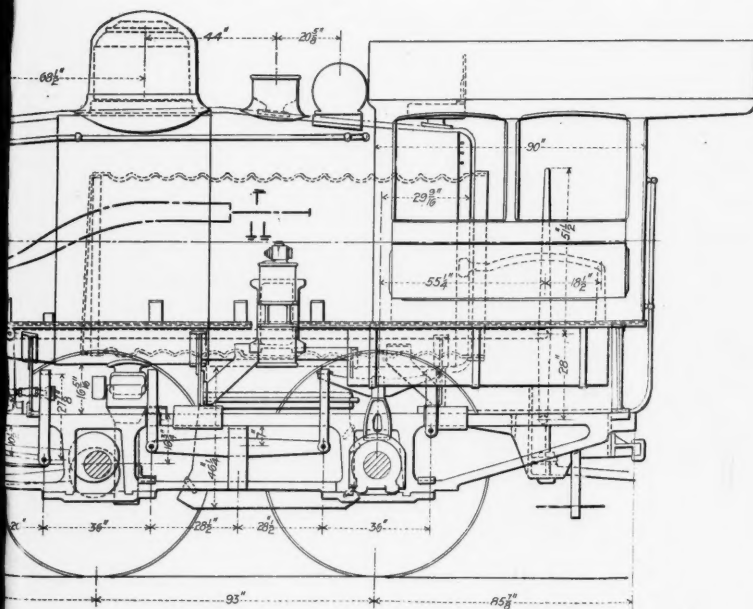
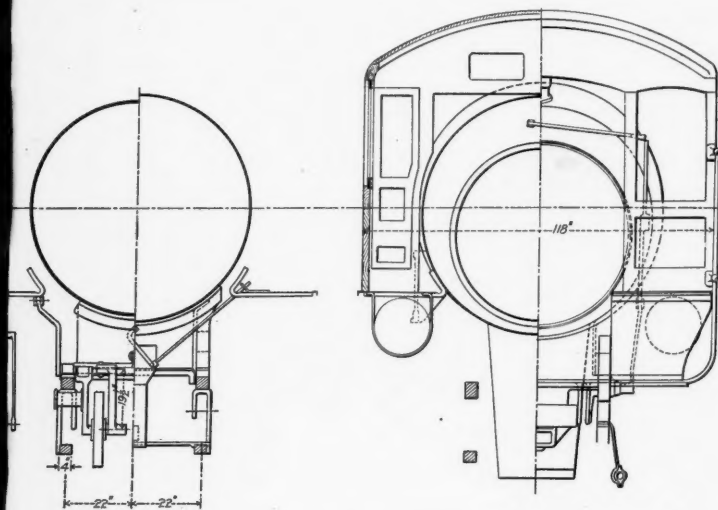
A BALDWIN FOUR-CYLINDER BALANCED COMPOUND LOCO

Built by the BALDWIN LOCOMOTIVE WORKS, MR. S. M. VAUCLAIN, General Superintendent.



#### AL SPECIFICATIONS.

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A BALDWIN FOUR-CYLINDER BALANCED COMPOUND LOCOMOTIVE.







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## Cuban Railroads.

There are three English-owned railroads in the Island of Cuba possessing between them a total mileage of 569 miles, and a combined capital of £8,340,000 authorized, all of which is issued or specially hypothecated for a certain purpose, with the exception of £173,995. This means that the authorized capital per mile is about £14,650, which is somewhat heavy. The total net earnings of about £300,127 per annum are equal to about £510 per mile per annum, and about 3½ per cent. on the capital, so that the general result is that English investors are not gainers from their dealings with Cuban railroads.

The youngest of these concerns, and the one which at the moment appears to be making the most headway, is the Cuban Central Railways, an undertaking registered so recently as 1899. Its authorized capital is £1,000,000 in 4½ per cent. mortgage debentures, and £1,800,000, half of which are ordinary and half 5½ per cent. cumulative preference. All the capital has been issued with the exception of £250,000 of the debentures, and as £200,000 of these are reserved to provide for mortgage bonds of extinct native companies taken over, only £50,000 of the £2,800,000 authorized capital remains unissued.

The property which this company acquired consisted of three railroads, which were worked and owned by three different local companies, their total length being 214 miles, with several short branches serving sugar estates, and certain wharves, piers, and shipping appliances. The railroads had been working many years, and the net earnings during the three years preceding the rebellion in Cuba averaged £141,625 per annum. Since the present company has been formed and peace has been restored in the island the gross receipts have been £196,530 for 1899-1900 and £248,227 for 1900-01, while the net earnings have been £84,842 for 1899-1900 and £117,537 for 1900-01, a very satisfactory and substantial improvement, but still leaving the company considerably behind the average for the years before the Cuban revolt. Since its establishment the preference and debenture interest has been paid, and for 1900-01 an ordinary dividend of 1 per cent. has just been paid, while £5,000 has been set aside for the formation of a maintenance and casualty fund, and £4,523 is carried forward.

The report just presented to the shareholders of the Western of Havana Railway is not nearly so good, for although there is a good dividend, it is much less than in the previous year, so that it would seem that the improvement which set in after the conclusion of the Spanish-American war is not likely to continue, and as current traffics are decreasing, a distinct retrogression is to be feared. This company was registered in 1892, to acquire a native railroad 100 miles in length, part of which had then been opened for traffic over 20 years, and to construct a further 10 miles which have since been made, so that the length now is 110 miles. The authorized capital is £600,000, all issued and are paid up. In addition, 6 per cent. debenture capital to the extent of £350,000 was issued; but this year the directors exercised their powers, and have redeemed these by the issue of £400,000 of 4½ per cent. debentures, a deal which will in future save this company about £10,000 a year in fixed charges.

This railroad's fortunes have fluctuated considerably, the revolt in Cuba, followed by the Spanish-American war, having played havoc with its earnings. For 1895-96 the net earnings were only £29,452, increasing to £55,345 for 1896-97; but declining to £42,912 for 1897-98, and again improving to £70,733 for 1898-99, and to £102,757 for 1899-1900. The year which ended last June, however, returned to the level of 1898-99, with net receipts at only £70,418. As to the dividend, the average for the nine years was 3½ per cent. per annum, and has fluctuated between nil in three years and 10 per cent. for 1899-1900, that for 1900-01, just paid, having been 6 per cent., with £5,241 forward.

The United Railways of Havana is another comparatively new concern, having been registered in the early part of 1898. The last report issued deals with the year 1900. In addition to 245 miles of line, this company also owns land, warehouses, and a banking business, so that its capital is rather large. It consists of: £140,000 fully paid £10 deferred shares and £1,400,000 3 per cent. preferred £10 shares, both classes having been issued to the vendors; £380,000 5 per cent. "A" irredeemable debenture stock, and £1,276,700 5 per cent. consolidated irredeemable debenture stock. The result of working in 1898 was a profit of £134,465, and in 1899 a profit of only £113,400, which further decreased to only £112,172 for 1900; but is certain to be much better for the current year. Interest has so far always been paid on the two debenture issues, and for 1898 both the preferred and deferred shares got 3 per cent., but only 1 per cent. on the preferred was paid for 1899. For 1900 the available balance, after paying debenture charges, was only £7,335, of which £7,000 was placed to the credit of the reserve fund, and nothing paid on either class of shares. During the first half of 1901 the receipts showed such a good improvement that the directors decided to pay 2 per cent. on the preferred shares, and as their 3 per cent. interest is cumulative, a further 4 per cent. would have to be paid for 1901 to entirely wipe out arrears.

As to the prospects, current traffics would appear to indicate a better outlook for the United Railways of Havana than either of the others, the increase to date being £49,707, but as that figure is a few thousand pounds below the increase in June last, no progress has been made for some months. As it requires £14,000 to pay 1 per cent. on the preferred shares, and these have

already had 2 per cent. out of this year's earnings, there is very little prospect of a further distribution for 1901, and these shares, therefore, appear to be highly priced at their present quotation. The Cuban Central has an increase of £6,757 for 17 weeks, which is good, but as it takes £9,000 to add 1 per cent. to the ordinary dividend, these shares seem also quite high enough. The Western of Havana ordinaries would be a fair purchase at present price if the 6 per cent. dividend were safe, but with a £21,903 decrease for 17 weeks, the outlook is best described as speculative.—*The Economist*.

## TECHNICAL.

## Manufacturing and Business.

The address of Mr. Daniel Bontecou is now 605 Postal Telegraph Building, Kansas City, Mo.

John H. Allen is now connected with the Standard Railway Equipment Co., Suite 515, Union Trust Building, St. Louis, Mo.

Charles F. Pierce has been appointed to the railroad department of the Goodwin Car Co. and will have headquarters at their New York office, 96 Fifth avenue.

The Fairfield Car Wheel Co. has been incorporated under the laws of Maine to make car wheels. The capital is \$500,000. Horace Mitchell, of Kittery, Me., is President.

E. B. Pickhardt, formerly with the Eclipse Co., at Chicago, has been appointed sales agent of the Pressed Steel Car Co., with headquarters at 1309 Fisher Building, Chicago.

The Hicks Locomotive & Car Works have recently sold 60 flat cars to the Brooks-Scanlon Lumber Co., of Minneapolis, and have sold two engines and one passenger coach to other parties.

The James H. Rice Co. has moved to 80-82 Wabash avenue, Chicago, and in addition to doing a glass business, will sell wholesale the paints made by Harrison Bros. & Co., Inc., of Philadelphia, Pa.

The Western Railway Equipment Co. was incorporated in New Jersey last week, with a capital of \$500,000, to make railroad equipment. The incorporators are: K. K. McLaren, Louis B. Daily and H. O. Coughlan.

A. O. Norton, manufacturer of the Norton jack, has moved from 167 Oliver street to larger quarters at 286 Congress street, Boston. Considerable new machinery has been added and the capacity of the plant increased proportionately.

The Morden Frog & Crossing Works, Chicago, Ill., have just let contracts for an addition to its plant, the building to be 120 x 102 ft. The new plant will be equipped and operated by electricity. The additional machinery has been contracted for.

The Hooker Steam Pump Co., 101 North Third street, St. Louis, Mo., reports the sale of two outside-packed plunger pumps of 1,000,000 gals. capacity each to the Missouri, Kansas & Texas. These pumps are used at Denison, Texas, in pumping water through 10 miles of pipe and to a height of 350 ft.

The Signal & Control Co. was incorporated recently in New York State to make automatic signals to be operated by steam or electricity. The incorporators are: Jacob W. Miller, 113 East Thirtieth street, New York; Geo. B. Hopkins, 120 Broadway, New York; Wm. P. Dixon, 32 Liberty street, New York.

The Anglo-American Switch & Signal Co. has recently been incorporated under the laws of New York State to make appliances for switching and stopping railroad trains. The incorporators are: Chas. T. B. Rowe, 330 West Eighty-seventh street, New York; Frederick V. R. Turk, 210 West 121st street, New York; Arthur C. Bostwick, 250 West 130th street, New York.

Julian L. Yale has been made Vice-President of the American McKenna Process Co., with headquarters in The Rookery, Chicago. Mr. Yale will supervise for the company the purchase and sale of rails and other material and make contracts for renewing rails for railroads and others. This company has re-rolling plants at Joliet, Ill., Kansas City and Tremley Point, N. Y.

A number of tests of the Kincaid locomotive stoker have been made on various roads during the winter months and interest in the device seems to be increasing among railroad officials. Several small orders have been booked by the makers. As soon as the present congested condition of traffic is relieved it is probable that railroads will be able to give more attention to experiments with this apparatus.

## Iron and Steel.

The Newport News Shipbuilding & Dry Dock Co. has bought the big foundry formerly owned and operated by Caskey Bros.

John Kirkpatrick, Sr., Manager of the Pittsburgh & Lake Superior Iron Co., died at his home at Palmer, Mich., Feb. 19, aged 62.

Despatches from Worcester, Mass., announce that the wrench business of Loring Coes & Co., Inc., and that of the Coes Wrench Co. are to be consolidated.

The Bessemer department of the Clergue plant at Sault Ste. Marie, Ont., began work on Feb. 18. The Clergue Co. has contracts to supply rails this year.

F. C. Smink, General Manager of the Reading Iron

Co., has been elected President, succeeding Geo. F. Baer, now President of the Philadelphia & Reading Ry.

The Crewe Works of the London & North Western Ry., it is said, are to be considerably extended. The enlargement of the erecting shops and foundries will give work for another 1,000 men.

Thomas M. Moore has been appointed Chief of the Machinery Department of the Louisiana Purchase Exposition. Capt. David P. Jones, U. S. N., retired, is Consulting Mechanical Engineer.

The Block Bridge & Culvert Co., with a capital of \$25,000, has been incorporated under the laws of Indiana by W. W. Baker, W. B. Blair, Everett Wagner, B. L. Blair and Hillis F. Hackedorn.

A large new steel and wire plant of the Pittsburgh Steel Co., which is now building at Monessen, will be finished ready for operation about April 1. The General Manager will be Geo. Nash, formerly of Rankin, Pa.

The Bessemer Association has fixed the price for Bessemer pig for the third quarter of the year at \$16 a ton at Valley furnaces. The Association comprises nearly all the merchant blast furnaces of the Shenango and Mahoning Valleys.

It is announced that the various departments of the Colorado Fuel & Iron Co., now building, will be in operation by next fall. The additions will include mail, wire and tin mills. Another new furnace, with a maximum capacity of 500 tons a day, will be started in April.

Work on the new angle mill of the Carnegie Steel Co., at Homestead, is reported progressing rapidly. It will have a capacity of 5,000 tons a month. There is no truth in the report that the Carnegie Co. has leased the entire plant of the Tidewater Steel Co. at Chester, Pa., to make angles.

It is announced that P. & F. Corbin Co., of New Britain, Conn., and Russell & Erwin, large hardware manufacturers, are to be consolidated. Chas. M. Jarvis, formerly President of the American Bridge Co., is Vice-President of the P. & F. Corbin Co. The consolidated concern will be known as the American Hardware Co.

About 15 of the independent sheet mills, on Feb. 18, organized the Independent Sheet Manufacturers' Association. W. L. Glessner, of the Laughlin Nail Co., of Martin's Ferry, Ohio, was elected Chairman, and A. L. Baumgarten, of Pittsburgh, Vice-President of the Maryland Steel Co., Secretary. The Association will meet monthly to consider trade matters. There is some talk of building a mill to supply the outside trade with sheet plates, but nothing definite can be learned.

## An End of Steel Bolster Litigation.

All existing litigation between the Shickle, Harrison & Howard Iron Co., of St. Louis, and the American Steel Casting Company, of Chester, Pa., has been ended and each of these companies has the right to manufacture under their respective patents the solid cast-steel bolsters now adopted by leading railroad companies.

## Electro-Pneumatic Signals in a Sleet Storm.

The electro-pneumatic signals in use on the Pennsylvania Railroad had a supreme test in the recent storm which played such havoc with the overhead wires. The Engineer of Signals has received reports from all portions of the roads on which electric signals have been installed that there was not the slightest interruption in the operation of the signals. Although the usefulness of over ten miles of telegraph and telephone wire was destroyed on the New York Division alone, not an inch of the protected wire in the tubes was harmed. The signals were set with perfect regularity in spite of the severity of the ice storm, and very little detention of traffic was experienced on the sections of the line where the trains are guided by this automatic system.

## The New Mississippi River Bridge.

Messrs. Alfred Noble and Ralph Modjeski, Chicago, as stated in our news columns Feb. 14, have been retained as engineers for a bridge over the Mississippi River at Grays Point, Mo. This bridge will be built and owned by the Southern Illinois & Missouri Bridge Co., and will replace the car ferries at Grays Point, on the St. Louis Southwestern. A branch of the Chicago & Eastern Illinois ends at Thebes and a branch of the Illinois Central at Gale, from which points cars for the St. Louis Southwestern and Missouri Pacific System are now ferried across the River to Grays Point. When finished, the interchange of cars between these roads will be by the new bridge. The bridge will be a double-track, through structure with masonry piers extending to rock, which, at this point, is not more than 40 ft. below low water level. The clearance beneath the lowest portion of the superstructure at high water will be 65 ft. Beginning at the east end there will be first about 600 ft. of concrete arches having 45 or 50-ft. openings; then in order a 320-ft. span; one span each of 521 ft. 3 in., 671 ft., 521 ft. 3 in., 518 ft. 5 in.; then a concrete arch with a clear opening of 100 ft. followed by about 600 ft. of concrete arches with 45 or 50-ft. openings. In the earth approaches at the ends about 300,000 cu. yds. of filling will be used. The bridge will be designed for the heaviest locomotives. The plans are sufficiently advanced so that bids for the substructure will soon be asked for.

## New Steel Casting Plant.

The Commonwealth Steel Co. has bought 18 acres of land on the east side of the Mississippi River opposite St. Louis, Mo., and is preparing to build a large steel casting



plant. The company controls patents on truck bolsters, a swing-motion truck, freight car transom and other railroad specialties. The offices of the company are at 415 Locust street, St. Louis. The officers are as follows: President, James Hopkins, Vice-President Diamond Match Co.; First Vice-President, Wm. F. Niedringhaus, of the National Enameling & Stamping Co.; Second Vice-President and Manager Sales Department, J. S. Andrews; General Manager and Secretary, O. S. Pulliam, formerly Secretary of the American Steel Foundry Co.; Treasurer, L. J. Hayward, formerly Treasurer of the American Steel Foundry Co., and Works Manager, C. T. Westlake, formerly General Superintendent American Steel Foundry Co.

#### Consolidation of Edged Tool Makers.

Negotiations are under way for a consolidation of axe and edged tool interests of the United States, the new company to have a capital of about \$25,000,000. The companies which have given options are: The American Axe & Tool Co., a consolidation of 10 or 12 plants, with headquarters in New York, and factories in Pittsburgh, Beaver Falls, and Lewiston, Pa., and Jamestown, N. Y.; the Kelly Axe Manufacturing Co., at Alexandria, Ind.; the Warren Axe & Tool Co., Warren, Pa.; the United States Edged Tool Co., Cattaraugus, N. Y.; the Standard Axe Co., Pennsylvania; the Mann Edged Tool Co., Lewiston, Pa.; James H. Mann & Co., New York; Romer Axe Co., Dunkirk, N. Y.; and two other companies.

#### New Shops for the Canadian Pacific.

Sir Thomas G. Shaughnessy, President of the Canadian Pacific, has announced that the company has made final arrangements for property in the east end of Montreal, where it will locate the proposed car and locomotive building shops. It is said that plans are now being made for the various buildings for this plant, in which will be consolidated all the shops of the Canadian Pacific.

#### Navy Yard Specifications.

Blank specifications for bids for supplies at the Puget Sound Navy Yard have been sent to the Chamber of Commerce at Seattle. The supplies consist largely of machinery to be used in the repair shops now being built at the Navy Yard. The following are some of the pieces of machinery on which bids are asked: One improved reversible shaper, with iron table and countershaft; one latest improved power mortiser; one pattern maker's lathe; one double-end emery grinder; one screw-cutting lathe; two screw-cutting engine lathes.

#### The Railroad Supply Company's Crossing Signals.

The Railroad Supply Company, of Chicago, announces that its suit against the American Signal Company for infringing patents covering the Chicago Crossing Signal has been won, the court, on Nov. 10, 1901, holding the Railroad Supply Co.'s patents valid and infringing by defendant's signal. In view of this suit the American Signal Co. has transferred its entire business and patents to the Railroad Supply Co. The latter has also acquired the crossing alarm business of the Three Rivers Railway Supply Co., that of the O'Neil Highway Crossing Alarm Co., Slater & Barnes, and about thirty (30) other signal patents; so that it is now ready to furnish crossing alarms for any crossing, no matter how complicated.

#### Air-Brakes at Nashville.

Air-brake cars cut out leaving Nashville yard of the Nashville, Chattanooga & St. Louis Railway, January, 1902:

Number of air-brake cars forwarded.....	8,840
Number of air-brake cars O. K.....	8,720
Air-brake cars cut out.....	120
Average serviceable air-brake cars per train.....	16.4

Of the 120 cars cut out, there were:

Blowing at exhaust.....	22
Blowing at vent port, New York.....	1
Check valve case gasket blown out.....	4
Triple valve needed cleaning.....	1
Check valve case thread stripped.....	1
Check valve case cracked.....	1
Release valve leaking.....	6
Works emergency, service application.....	1
Brake cylinder gasket blown out.....	1
Brake cylinder cracked.....	1
Piston travel too short.....	1
Piston travel too long.....	1
Push rod gone.....	1
Train pipe broken.....	2
Branch pipe broken.....	15
Flat wheels.....	39
Brake rigging out of order.....	22

Total..... 120

Of the 120 cars cut out, 90 belonged to railroad companies and 30 to private car lines.

Air-brake cars cut out coming into Nashville yard, January, 1902:

Blowing at exhaust.....	42
Blowing at vent port.....	19
Triple valve needed cleaning.....	25
Triple valve gasket worn out.....	7
Triple piston packing ring worn out.....	7
Check valve case gasket blown out.....	14
Check valve thread stripped.....	1
Check valve case cracked.....	1
Works emergency, service application.....	13
Release valve leaking.....	44
Release valve broken.....	1
Angle cock leaking.....	1
Train pipe broken.....	9
Branch pipe broken.....	21
Unions leaking.....	18
Cylinder piston packing ring worn out.....	3
Brake cylinder gasket blown out.....	1
Push rod gone.....	1
Piston travel too short.....	1
Piston travel too long.....	1
Brake rigging out of order.....	34
Flat wheels.....	43

Total..... 307

Cars leaving Nashville with brakes cut out..... 120

Cars repaired..... 187

### THE SCRAP HEAP.

#### Notes.

The Illinois Central is building three large greenhouses at Champaign, Ill.

The Chicago Great Western announces that it will run tourists' sleeping cars between Chicago and St. Paul, berths to be sold for \$1 each. It is expected that the cars will be run twice a week each way.

The Railroad Commissioners of Texas have sent to the railroads of that State an order requiring that in every railroad office, including local freight stations, all correspondence, records, books, etc., shall be preserved.

The newspapers announce that on the Delaware, Lackawanna & Western and the Lehigh Valley the several brotherhoods of employees have formed federations; and the federation includes all of the old brotherhoods, not excepting the Brotherhood of Locomotive Engineers. The Switchmen's Union, a comparatively new organization, does not appear to be represented. As regards the Lackawanna road, this newspaper report appears to be well founded; but that concerning the Lehigh Valley has not as yet been confirmed.

#### Library of the American Society of Mechanical Engineers.

There have recently been added to the Library of the American Society of Mechanical Engineers, 12 West Thirty-first street, the list of books given below. The Library contains one of the best collections of engineering literature in the City of New York, and is especially rich in files of the proceedings of the technical societies of this and other countries, and journals published both in the United States and abroad. There is also a valuable collection of historical books bearing on mechanical and scientific subjects, which is useful in research work. New books are added as they appear, and important articles in the current files of the engineering papers are indexed in the card catalogue, so as to make them immediately available. The Library is open to the public between the hours of 10 a.m. and 10 p.m., and offers to those interested in engineering a pleasant and convenient spot for reading and study.

Marine Engineering, W. F. Durand.  
Chemistry for Engineers, Blount and Bloxam.  
Practice and Theory of Frame Structures, J. B. Johnson.  
Compressed Air, G. D. Hiscow.  
Development of Water Power, J. G. Frizell.  
Locomotive Construction, J. G. A. Meyer.  
Law of Contracts, J. C. Wait.  
Elements of Electrical Engineering, C. P. Steinmetz.  
Street Railway Motors, G. C. Hanchett.  
Induction Coil, F. Allsop.  
American Telephone Practice, K. B. Miller.  
MIL Construction, H. G. Tyrrell.  
Steel Ship Construction, T. C. Walton.  
Gas Engines, G. D. Hiscow.  
Railway Handbook, A. B. Herrick.  
The Induction Motor, B. A. Behrend.  
Dynamo Electric Machinery, Houston & Kennelly.  
Wireless Telegraphy, O. Lodge.  
Testing of Dynamos and Motors, Parham and Shedd.  
Electric Lighting, 2 Vols., F. B. Crocker.  
Potentiometer, L. B. Fisher.  
Electric Tramways, Philip Dawson.

#### Validity of the New East River Bridge Contract.

Supreme Court Justice Gaynor, of Brooklyn, has decided against William F. Knowles in his action to have the contract between the Commissioners of the New East River Bridge and the Pennsylvania Steel Company annulled. He finds that there is no foundation for the alleged fraudulent intent in the giving of the contract. This is part of the opinion:

"Concededly the necessary effect of the requirements of the Commissioners in the present case was to limit competition. But it was necessary that a great public work which they were building should be built safe and durable and without defaults and delays, that the right material should be used and that the contractor should be an experienced bridge builder and have a going plant and facilities long enough established and in use to be known to be adequate to carry on the work forthwith. By exacting requirements to this effect the Commissioners therefore only performed details of duty and judgment required of them by law. It follows that in order to state a cause of action against them it is not enough for the plaintiff to allege that such requirements were fraudulent because they limited competition; it was necessary for him to go further, and state specific facts constituting fraudulent breach of trust by them in giving out the contract."

#### Passenger Traffic Between Europe and the United States.

The statistics of the past year show that notwithstanding there was during 1901 no special attraction more potent than the Industrial Exhibition at Glasgow, the number of American visitors to Europe exceeded that of 1900, the year of the Paris Exposition. The statistics thus far available show the number of round-trip voyages made and the passengers carried from European ports to New York during the past year, by steamers of the several principal steamship companies, and the following list includes companies whose total of steerage passengers exceeded 15,000 during the year:

	Cabin.	Steer- age.	Voy- ages.
North German Lloyd (Bremen).....	20,403	76,804	86
Hamburg-American (Hamburg).....	20,524	63,223	106
Compagnie Générale Transatlantique.....	7,279	35,961	54
Red Star Line.....	6,241	32,793	52
White Star Line.....	18,167	30,483	66
Holland-American Line.....	5,595	25,966	51
Navigazione Generale Italiana.....	538	24,690	27
North German Lloyd (Mediterranean).....	2,537	24,580	36
Canard Line.....	17,733	19,943	37
Anchor Line (Mediterranean).....	70	16,132	34
Hamburg-American Line (Mediterranean).....	453	15,337	25

One class of European passengers to the United States has increased in a marked degree during the past three years, and was never so numerous as in 1901. This group includes the investigators, men of science and business, engineers, master mechanics, sociologists and statesmen, who have made tours of observation to study the causes, the methods, and processes which underlie the prosperity of the United States.

#### Launching the Meteor III.

Considering all things, the launching of the cruiser schooner yacht Meteor III, at the yard of the Townsend-Downey Shipbuilding Co., Shooters Island, N. Y., on the morning of Feb. 25, may be said to have been one of the most successful and brilliant launches on record. The yacht was christened by Miss Alice Roosevelt, daughter of the President of the United States, and the ceremony was witnessed by the President.

Prince Henry of Prussia (representing his brother, the Emperor of Germany, for whom the yacht was built), the Mayor of New York City, and a number of other distinguished guests and some 4,000 other persons. Luncheon was served in one of the buildings of the Townsend-Downey Company, and everything possible was done by the company for the convenience and comfort of its guests. Shooters Island is in the lower end of Newark Bay, a short distance from the shore of Staten Island. With the limited facilities for handling the large crowd in a confined space, it is remarkable that no accident occurred. The yacht will be sent to England to be finished. It measures 160 ft. long over all, 120 ft. long over water line, and 27 ft. wide over moulding.

#### New York Nautical College.

An evening class in the First Course of the Department of Naval Architecture will be started on the 3rd of March to accommodate those wishing to take up this work in connection with their regular occupation. The class will meet Monday, Wednesday and Friday of each week from 7 to 9 p.m. From eight to ten weeks will be required to cover the work, which will consist of the details under the following general heads: Fundamental Laws; Calculations of Displacement and Centers; Types of Ships; Construction of Wooden, Steel and Composite Ships; Operations of Shipbuilding; Laying-off.

#### Fast Run from Philadelphia to Jersey City.

General Passenger Agent Burt, of the Central of New Jersey, has sent out an abstract of the train-sheet record of the special train over the Reading and the Jersey Central by which Mr. J. Pierpont Morgan was carried from Philadelphia to Jersey City, on Feb. 7, in 84.5 minutes, the distance being 90.2 miles. The train consisted of Philadelphia & Reading engine No. 316, and two cars. From Somerton to Weston, 37.9 miles, the time was 30 minutes, equal to 75 miles an hour.

#### Technical Schools and Colleges.

*Johns Hopkins University.*—The exercises held on Feb. 22 to mark the first quarter-century in the history of this University were attended by 4,000 alumni and guests from all parts of the country. The chief features of this celebration were an address by the retiring President, Dr. Gilman, the inaugural address of the new President, Dr. Remsen, and a congratulatory address by President Eliot, of Harvard, the exercises of the day being followed by a banquet given by the Alumni Association in the evening, at which covers were laid for 600 guests. The degree of Doctor of Laws was conferred as follows: Arthur Twining Hadley, of Yale; Charles William Eliot, of Harvard; James Burrill Angell, University of Michigan; Henry Smith Pritchett, Massachusetts Institute of Technology; Andrew Dickson White, John Shaw Billings, James Schouler, Granville Stanley Hall, Clark University; John William Mallet, University of Virginia; Charles Doolittle Walcott, Superintendent of the U. S. Geological Survey; Simon Newcomb, Professor of Mathematics, U. S. N.; James Loudon, University of Toronto; Benjamin Ide Wheeler, University of California; David Starr Jordan, Stanford University; William Rainey Harper, University of Chicago; Francis Landey Patton, of Princeton; William Peterson, McGill University, Montreal; Josiah Royce, of Harvard; John Franklin Jameson, University of Chicago; Edmund B. Wilson and Nicholas Murray Butler, of Columbia University; Woodrow Wilson, of Philadelphia, and Charles William Dabney, University of Tennessee.

*Lehigh University.*—The following scholarships will be open to competition at the annual examinations in June, 1902: Two in the Classical Course of \$150 and \$100 each; one in the Latin-Scientific Course of \$125; five in the following courses—Civil Engineering, Mechanical Engineering, Electrical Engineering, Mining Engineering and Metallurgy, and Chemistry of \$150 each. All fees are remitted to those holding these scholarships except the fees and deposits required in the various laboratories. The scholarships will be awarded to the students having the highest general averages in all subjects required for entrance to the above courses, provided, however, that the applicant does not receive in any subject a mark below 70 per cent. Competitors for these scholarships must announce definitely, at least one week before the time of the June examinations (19th, 20th and 21st), their intention of entering the competition and the course they desire to take. As there is but one prize to be awarded in the departments of Mining and Metallurgy, the successful competitor may choose one or other of these courses. The examinations must be taken at the University in South Bethlehem.

#### New Stations on the Philadelphia & Reading.

The Philadelphia & Reading is gradually rebuilding many of the stations along its line. It has recently built a new station at Elkins, which cost about \$35,000, and which replaced the stations at Ashbourne and Ogontz. At Wayne Junction, on the Germantown Line, a fine brick station has been built at a cost of about \$150,000. Sellersville came next and a fine new brick station has just been completed. New stations are building at Tioga, Nicetown and Fort Washington, and plans have been made, or are being made, for others at Lansdale, Quakertown, Pottstown, and Bryn Athyn. Plans for the new passenger station at Harrisburg have been in preparation for some time, and it will probably be built during the coming summer. A new station is also in course of construction at Summerdale, on the Frankford Branch. Other points are being considered, but no determination to build has yet been arrived at. Among these are Royersford and Pottstown. At a number of stations the company is building concrete platforms and shelter sheds. A booth for cab calls is being built in the loggia of the terminal station at Philadelphia, east of the Market street entrance to the trainshed.

#### The Duty of Catching Train Robbers.

As a result of the hold-up and robbery of the express car on the Southern railroad in Dorchester county, South Carolina, the Southern Express Company and the railroad people have supplemented the reward of \$400 offered by the State of South Carolina with an offer of \$600, making a total of \$1,000 for the arrest of the robber or robbers. The amount stolen from the company was only \$12.50, but the Southern Express Company will allow no expense to stand in the way of protecting its patrons and putting a stop to highway robbery. While the company has always been willing to do this, and has been wonderfully successful in the arrest and conviction of robbers, it is not a very satisfactory compliment on the efficiency of State constabularies that the company is forced to put up each time such large sums of money as rewards for official activity. Inasmuch as the railroads and the express companies pay very handsomely in the way of taxes for protection,



it would seem that the government ought to make adequate provisions for the capture of these highwaymen. Under present conditions the greatest difficulty is encountered in securing the co-operation of State constabularies in pursuing and capturing these highwaymen. Railroad and express companies ought to have the protection of the national authorities—marshals and their deputies—and then we would find a great diminution in railroad hold-ups and express robberies, and at the same time the burden of protecting life and property would fall where it belongs—upon government and not upon private corporations.—*Chattanooga Times*.

#### New Elevator at Port Arthur.

A large grain elevator is being built at Port Arthur, Ontario, for the Canadian Northern, that will have a capacity of over a million bushels. The elevator is built on piles and concrete piers. The building is 239 ft. long, 95 ft. high, and measures from the level of the foundation to the gables 157 ft. 6 in. The elevator contains 108 bins, each with a capacity of 9,500 bushels. For elevating purposes the building has ten legs, of 10,000 bushels per hour each. There are also ten shipping spouts with larger capacity. There are two tracks alongside the elevator. The building supplies its own lighting and motive power, the engines being 750 h.p. The main frame of the structure is of red pine, the piles of tamarac and cribbing of hemlock. The contractor is J. A. Jamieson, of Montreal, and the work has been done by James Wain- ing.

#### A Little Car Fire.

The Broadway cars were blocked for half an hour last night (Feb. 5), because of a fire which occurred on an empty car at Forty-second street. The fuse of the car had burned out at Twenty-third street, and the car was being pushed to the sheds at Fifth street and Broadway by another car. By the time the car reached Forty-second street its floor was all ablaze.—*N. Y. Sun*.

#### Grade Crossings in Texas.

February 1 was the time for the railroads of Texas to report to the State Railroad Commissioners on the subject of signals for grade crossings. Not all of the railroads have sent in their plans. The Chicago, Rock Island & Texas has 10 crossings, and proposes to abandon two of them; at two others the grades will be separated. Interlocking will be put in at the rest. The St. Louis Southwestern says that its business is so light that interlocking is not warranted. The company, therefore, favors the use of a gate, which shall always be closed across one line or the other. It is said that many gates have been put up in Texas since the passage of the law under which the Commissioners are now acting. At a crossing where one road wants interlocking signals and the other is satisfied with a gate, the Commission will decide what shall be done.

The Houston & Texas Central advises that it has 32 main line crossings. Interlocking plants are to be installed at Navasota and College, and investigations are being made as to non-grade crossings at Navasota, at Dallas, at Waxahachie and at Midlothian. The Texas & Pacific crossing at Fort Worth, it is estimated, would cost \$94,000 to be made non-grade.

The San Antonio & Aransas Pass submits a statement showing 20 main line crossings, and asserting that it is impracticable to make any of them non-grade. Gates are used at most of these crossings.

The Texas & Pacific also has 20 main line crossings, and presents an objection to interlocking devices, "for the reason that the proper handling of interlocking devices devolves upon one individual, while the responsibility of the crossing being clear, where gates are used, rests upon two or more of the train crew in every instance. With gates, the engineer assumes an individual responsibility in the matter of seeing that the crossing is clear."

The Texas Midland says that a separation of the grades at its eight crossings is impossible and interlocking is not warranted because of few trains.

The Gulf, Colorado & Santa Fe has 37 main line crossings, and to put in interlocking devices at all of them would cost \$203,700. Of that number it is estimated that 12 could be made non-grade at a cost of \$735,000. This company requests a general meeting so that an agreement may be reached as to interlocking plants.

#### Metric System Hearings.

The Committee on Coinage, Weights and Measures of the House of Representatives gave hearings at Washington, on Feb. 6 and 8, on the Metric System, when about 30 business and technical men and manufacturers were present to give their views. Among those heard were: Prof. Elihu Thompson, of the General Electric Company; Mr. W. M. McFarland, Vice-President of the Westinghouse Electric & Manufacturing Co.; Mr. James Christie, Superintendent of the Pencoyd Bridge Works; Dr. A. E. Kennelly, Electrical Engineer of Philadelphia; Mr. Henry Troemner, maker of scales and weights; Mr. Cosby, representing the Arlington Mills of Massachusetts, and a number of others, including Dr. Tittmann, Superintendent of the U. S. Coast and Geodetic Survey, the Commissioner of Internal Revenue and the Director of the Mint. The sentiment of those who testified was favorable to a change, permitting the use of the Metric System where preferred, although Mr. McFarland, for the Westinghouse Electric Co., opposed any change. A number of government officials and others have been asked to appear and testify before the Committee, and the hearings will be continued.

#### Havana Floating Dry Dock.

The work of preparing the necessary parts to be used in repairing the large floating dry dock bought from Spain and now at Havana, Cuba, has been completed at the New York Navy Yard, and the piping, castings, and other material needed have been shipped to Cuba. It is probable that the dock when finally completed will be sent to the new naval station at Olongapo, P. I.

#### Turbines and Engines in a Destroyer.

The London Times gives the following description of a destroyer recently launched on the Tyne:

"It is designed especially for steam turbine machinery, being generally of the same type as the *Viper* and the *Cabin*. It is named the *Victor*, and has not been built to the order of any government. The hull was built by Messrs. R. & W. Hawthorn, Leslie & Co., on the Tyne, while the machinery was made by the Parsons Marine Steam Turbine Company at Wallsend-on-Tyne. The vessel is 210 ft. long, 21 ft. wide and 12 ft. 6 in. moulded depth. Special attention has been paid to longitudinal strength. The main propelling machinery consists of two independent sets of Parsons turbine engines, one high pressure and one low pressure, being on each side of the vessel. This gives four turbines, each of which has its

own line of shafting, and as each shaft carries two propellers, there are eight propellers in all. A novel feature in this vessel is the introduction of ordinary reciprocating engines fitted in conjunction with steam turbines. These engines are of the triple-compound type, and are coupled direct to the main turbines and work in conjunction with them. They take steam directly from the boilers, and exhaust through the high-pressure turbine, the exhaust from the latter passing in turn through the low-pressure turbine, and from thence to the condensers. These reciprocating engines are for use at cruising speeds, when low power only is needed, and are, therefore, of comparatively small size. The boilers are of the Yarrow type."

#### Reopening of the Delagoa Bay Railroad.

Consul Hollis reports from Lourenzo Marquez, that the governor-general of Mozambique and the British military authorities have arrived at an understanding in regard to civil traffic over the Portuguese and Transvaal sections of the Delagoa Bay Railroad. Thirteen cars, of 10 tons capacity each, will constitute a train. This means that the Lourenzo Marquez merchants will be allowed to ship each day 130 tons of merchandise by rail to the Transvaal. The tariffs and the classification are to be the same as before the war. The transport of civil merchandise and goods into the Transvaal will commence immediately, the daily number of wagons for such merchandise not to be less than those forming a complete train. No exceptions regarding individuals or nationalities will be made in the forwarding of goods.

#### A Brown Bulletin.

"All concerned—An engineer has been suspended 15 days under the Brown system for giving up train, account guide bar breaking on left side of engine.

"An agent has been suspended five days for failure to stamp ticket on back.

"An engineer has been suspended 10 days for failure to furnish regular report covering accident to his train.

"A brakeman has been suspended 15 days for getting left at terminal.

"An engineer has been suspended five days for failure to leave coal ticket for coal taken from chute.

"Two engineers and six firemen have been suspended 10 days each for failure to file watch certificates as per instructions contained in general superintendent's circular of Jan. 20."

#### Small Steam Engines for Harput.

Under date of Jan. 4, 1902, Consul Norton writes from Harput, as follows: A demand has come to this consulate for small, portable steam engines, 1 to 3 h.p. They are desired to replace hand power in several of the local industries. Wood is the only available fuel. The entire plant, boiler and engine, should be compact and easily portable. The American agency here would gladly receive correspondence and price lists for such engines and boiler outfits, with agents' rates. Communications can be sent in the care of this consulate. Post-office address, Mezreh, Mamouret-ul-Aziz, Turkey in Asia.

#### LOCOMOTIVE BUILDING.

The Wisconsin Central has ordered 10 locomotives from the Brooks Locomotive Works.

The St. Louis Southwestern has ordered 31 locomotives from the Rogers Locomotive Works.

The Plant System has ordered six 10-wheel locomotives from the Baldwin Locomotive Works, to be built late in the autumn.

The Louisville & Nashville has ordered 10 locomotives from the Rogers Works, in addition to orders reported last December.

The Seaboard Air Line has an equipment agreement with Vermilye & Co., of New York, which has been admitted to record at Portsmouth, Va. It involves nearly \$1,000,000, and will cover, it is said, locomotives, box cars and 10 coaches.

The Chicago, Burlington & Quincy order with the Baldwin Locomotive Works, reported in our issue of Dec. 6, calls for 50 Prairie type locomotives, cylinders to be 21 x 26 in.; Dunbar piston packing; valves 12-in. piston; diameter of drivers, 69 in.; driving journals, 9 x 10 in.; trailing journals, 8 x 10 in.; truck journals, 5½ x 9 in.; boiler, straight top, with wide fire-box; outside diameter of first ring, 65¼ in.; outside diameter of dome, 68 in.; working pressure, 200 lbs.; length of tubes, 18 ft. 3 11-16 in.; diameter of tubes, 2¼ in.; number of tubes, 272; length of fire-box, 84 in.; width, 72 in.; tender capacity, 6,000 gallons of water and 11 tons of coal. Special equipment specified are Westinghouse brakes, 3-in. Ashton enclosed pop valve, Miner draft rigging and Aurora Railroad special hobbitt made by the Aurora Metal Co.

#### CAR BUILDING.

Seaboard Air Line, see Locomotive Building.

The Southern Missouri & Arkansas has ordered 25 box cars from Barney & Smith.

The Canadian Pacific has placed an order for 500 box cars with Rhodes, Curry & Co.

The Chicago, Indianapolis & Louisville has ordered one coach from the American Car & Foundry Co.

The Fremont, Elkhorn & Missouri Valley has ordered seven passenger coaches from the Pullman Co.

The Chicago Great Western has ordered 100 refrigerator cars from the American Car & Foundry Co.

The San Pedro, Los Angeles & Salt Lake has ordered 10 coaches from the American Car & Foundry Co.

The St. Louis Refrigerating Car Co. has ordered 120 refrigerator cars from the American Car & Foundry Co.

The Missouri Pacific has ordered 17 box, four furniture and one flat car from the American Car & Foundry Co.

The People's Ry. (Pottsville, Pa.) has ordered a combination passenger and baggage car from the American Car & Foundry Co.

The Quebec & Lake St. John has ordered 100 box cars from Rhodes, Curry & Co., and passenger equipment from the Crossen Car Mfg. Co.

The American Car & Foundry Co. has orders from two private parties for 37 logging cars and for 21 cars of various types for different parties.

The Wisconsin Central order reported last week consists of 300 box, 100 stock, and 25 refrigerator cars from the American Car & Foundry Co.

The Rodger Ballast Car Co. has received an order from the New York Central & Hudson River for 25 standard ballast cars of 40-ton capacity, and one standard distributing car for May delivery.

#### BRIDGE BUILDING.

ANGELTON, TEXAS.—The Commissioners' Court has ordered another bridge built across the Bernard River near Brazoria. It will cost about \$20,000.

ATLANTA, GA.—It is said that the railroads have offered to pay \$35,000 toward the cost of a viaduct over the tracks at Peters street. The city is to appropriate \$25,000.

BALTIMORE, MD.—The Block street drawbridge over Jones' Falls, which was built in 1879, at a cost of \$40,000, will soon undergo considerable repairs. Assistant City Engineer O. W. Connet has recommended that it be replaced by a bascule draw.

BARRIE, ONT.—A committee of the County Council has recommended that a steel bridge be built over the Severn River, between Orillia township and Muskoka district, at a cost of \$5,000.

BATAVIA, N. Y.—Surveys are being made by the Buffalo & Rochester Electric Ry. for a bridge across the creek just east of the Walnut street bridge.

BOSTON, MASS.—Bids are wanted, March 6, by the Metropolitan Water and Sewerage Board, No. 1 Ashburton place, for building abutments, etc., for a bridge over Sudbury River. W. N. Davenport, Secretary.

CHARLESTON, MO.—Bids are wanted, March 4, for a bridge across White Pond, on Charleston & Wolf Island Road. C. S. Reynolds, Commissioner.

CHATHAM, ONT.—The council of Chatham township has instructed W. G. McGeorge to prepare plans for a steel bridge to be built across the Sydenham River at Tupperville.

CHESTER, S. C.—The contract for the bridge over South Fork River, near Gastonia, for the Carolina & North Western Ry., has been let to the Virginia Bridge & Iron Co., as has also the contract for the bridge over Catawba River near Hickory, N. C. Proposals for several smaller bridges are now before the bridge companies to bid on. General Manager L. T. Nichols tells us that it is the intention to put the entire line under heavy steel structures for all crossings over 30-ft. span.

CHEYENNE, WYO.—Plans and specifications have been made for the contemplated county bridges, one across the North Platte and one across Laramie River.

CLARINDA, IOWA.—The Board of Supervisors of Page County will let contracts on April 10 for all bridges needed during the year. F. V. Hensleigh, County Auditor.

CLEVELAND, OHIO.—Bids are wanted, March 13, by Chas. P. Salen, Director of Public Works, for a plate girder approach to the Middle Seneca street bridge.

CLIFTON PARK, N. Y.—The Vischer's Ferry Co. has been incorporated with a capital stock of \$30,000 by J. R. Strang, Geo. H. Smith, M. J. Van Ranken and others, to build a bridge across Mohawk River between Clifton Park and Niskayuna.

COLORADO SPRINGS, COLO.—The bids for a bridge over South Tejon street are said to be too high. It is probable that new bids will be wanted in the near future. The estimated cost is \$24,000.

COLUMBUS, OHIO.—The County Commissioners and street railroad representatives are considering plans to have a new bridge built on Cleveland avenue to replace the present wooden structure.

DAVENPORT, IOWA.—City Engineer Thomas Murray has made soundings for the proposed bridge at the foot of Gaines street to City Island.

DES MOINES, IOWA.—The City Council is considering ordering the Keokuk & Western to build a viaduct across Eighteenth street.

FOND DU LAC, WIS.—Adolph Green, of Green Bay, has the contract for the abutments and foundations for the three-track bridge over Fond du Lac River for the Chicago & Northwestern.

FRANKFORT, IND.—Bids are wanted, March 10, by the County Commissioners, for some steel bridges and culverts. Frank B. Elliott, County Commissioner.

GREENFIELD, MASS.—An agreement has been reached between the cities of Greenfield and Deerfield and the Greenfield & Deerfield Street R. R., and now a steel bridge will be built over Deerfield River at Cheapside at a cost of \$19,600. The old stone piers will be used.

HOUGHTON, MICH.—Captain D. D. Gaillard, Corps of Engineers, U. S. A., will give a hearing on March 3, at Houghton, with reference to the proposed improvements to the bridge over Portage Lake, between Houghton and Hancock. The War Department considers that the bridge is an obstruction to navigation and that it should be rebuilt with a draw.

HOUSTON, TEX.—The question of building a new steel bridge over Buffalo Bayou is again under consideration. I. Austin Miller, City Engineer.

INDIANAPOLIS, IND.—The Washington street bridge will be built by the county. It will be of stone and will be paid for out of the unloaned school money now in the hands of the County Auditor. The contract will be let about May 1 and the bridge will cost about \$100,000.

JERSEY CITY, N. J.—The American Sugar Refining Co. proposes to build a bridge on Washington street between buildings on both sides of that street. Geo. Dinkel, Chief Engineer.

KERNEY, NEB.—Bids are wanted, March 15, by the County Clerk, for building two bridges.

LAWRENCE, MASS.—The project for a central bridge across the Merrimac river has been revived and the indications are that the matter will come to a head soon. Richard A. Hale, County Engineer.

LEXINGTON, PA.—The County Commissioners have ordered a steel bridge built over Swatara Creek in Union Township. Oscar G. Klapp, Clerk, County Commissioners.

MANCHESTER, N. H.—About \$6,000 will be spent in bridge repairs. Sam J. Lord, City Engineer.



**MANILA, PHILIPPINE ISLANDS.**—About \$20,000 will be spent on finishing the Santa Cruz bridge at Manila, under the direction of the municipality.

**MARQUETTE, MICH.**—The Secretary of War has approved plans for a drawbridge to be built at Marquette at a cost of about \$90,000.

**MAYSVILLE, VA.**—John W. Clay, at Maysville, can give particulars as to class of design, etc., and date for receiving bids for a steel bridge over Seneca Creek for Campbell County.

**MONTGOMERY, ALA.**—The County Board of Revenue has approved the recommendations for two new bridges on the upper Wetumpka road. The County Engineer will make plans.

**MONTREAL, QUE.**—The Minister of Railways and Canals is petitioned to build a bridge across the canal at Atwater avenue. Plans were made for this bridge about two years ago. It will cost about \$75,000.

**NORTH ANSON, ME.**—The Norridgewock Falls Toll Bridge Co. wants bids for building two 185-ft. spans. Ben. S. Collins, Secretary.

**NORTH WALES, PA.**—I. G. Lukens, Clerk of Council, says that plans have been made for the bridge at Pennsylvania avenue, but no date is set to get bids.

**ODEN, UTAH.**—A steel viaduct, according to report, will be built over Twenty-fourth street.

**ONEIDA CASTLE, N. Y.**—The Town Board of Vernon has recently voted to build a new steel bridge on Prospect street.

**OSHKOSH, WIS.**—The City Council is considering a proposition to build a drawbridge over Fox River from New street on the north side to Second avenue on the south side; probable cost, \$70,000. Geo. Randall, City Engineer.

**OWEN SOUND, ONT.**—During the present year two steel bridges will likely be built over the Sydenham river.

**PENDLETON, ORE.**—The Oregon Railroad & Navigation Co. will build 14 steel bridges this year. Some will be on the lines in Washington and some on the Oregon Division.

**PITTSBURGH, PA.**—Recorder Brown opened bids, Feb. 24, for the construction of the substructure of the South Tenth street bridge. C. M. Driver bid \$35,773 with a pile foundation under the piers and \$33,773 with a gravel foundation. Stratton, Lewis & Co.'s bid was \$41,946.18. The bids for the superstructure will be opened Friday of this week.

**QUINCY, MASS.**—The County Commissioners have rejected the bids received on Feb. 18 for building a bridge over Weymouth Fore River between Weymouth and Quincy. Two bids were received. The bidders were the United Construction Co. and the Boston Bridge Co. The plans were made by Hildreth & Co., engineers, New York city.

**RAT PORTAGE, ONT.**—A large bridge will be built across Winnipeg River at Rat Portage and the Government is asked to give assistance toward its construction. Mayor Cameron is interested.

**RENSSELAER, N. Y.**—The city is considering building a bridge over the railroad tracks at Third avenue, sometimes called Mechanic street.

**RICHMOND, VA.**—A resolution is before the City Council to have a free bridge built over the river near the site of Mayo's bridge.

**ROCHESTER, N. Y.**—A new bridge is proposed over the river at Vincent street.

**ST. HENRI, ONT.**—Mayor Guay has been authorized by the Council of St. Henri to petition the Dominion Government to have a subway built under the Grand Trunk tracks at St. Elizabeth street.

**ST. JOHN, N. B.**—Herbert E. Wardroper, City Clerk, has made application to the Canadian Parliament for permission to build a bridge over the harbor and river at St. John.

**SANDUSKY, OHIO.**—The Lake Shore & Michigan Southern bridge across Vermillion River gave way on Feb. 17 and 20 cars went into the river.

**SAVANNAH, GA.**—A bill was introduced in the House of Representatives, on Feb. 18, and referred to the Committee on Commerce, authorizing a bridge across the Savannah River from the mainland within the corporate limits of the city of Savannah to Hutchinson Island, Chatham County, Ga.

**SCRANTON, PA.**—The question of building a viaduct on West Lackawanna avenue is again under consideration. There is talk of issuing bonds to cover the cost of construction.

**SOUTH BEND, IND.**—The Terre Haute & Indianapolis R. R., according to report, will build a viaduct in South Bend at a cost of about \$65,000.

**SPRINGFIELD, MASS.**—A resolution has been introduced in the City Council to have the Plainfield street bridge made wider.

**STANTON, KY.**—The County Court has decided to rebuild three bridges.

**SUMMIT, N. J.**—The Summit City Council has made an agreement with the Delaware, Lackawanna & Western in regard to improvements in this city. The railroad is to build bridges over Springfield, Summit and Morris avenues and Maple street, each to be 50 ft. wide.

**TWO RIVERS, WIS.**—The Board of Public Works is considering the question of rebuilding Monroe street bridge. Joseph L. Kline, City Clerk.

**WATERTOWN, S. DAK.**—Bids are wanted, April 2, by the County Auditor, for building a combination bridge over Big Sioux River. F. L. Bramble, County Auditor.

**WILLIAMSPORT, PA.**—The County Court has been asked to build a bridge over Big Muncy Creek at Lyons Mills, in Wolf Township. Viewers have been appointed.

**WINCHESTER, ONT.**—The County Council will build a new bridge over the Nation River, between Matilda and Mountain. George Quart, Township Clerk.

**WINNIPEG, MAN.**—Z. Mailhot, C.E., for the Dominion Government, has been instructed to make surveys for a bridge to be built over the Red River in the municipality of Montcalm.

#### Other Structures.

**BIRMINGHAM, ALA.**—B. S. Catchings, James S. Dwyer and W. L. Sims have incorporated the Southern Rolling

Mill Co. and will build a plant in the Birmingham district.

**BROOKLYN, N. Y.**—Fire on Feb. 20, at the Union Depot of the Brooklyn Rapid Transit Co., Thirty-seventh street and Fifth avenue, Brooklyn, destroyed the machine shops, 25 motor and elevator cars, the oil storage house and the coal house; also the switch tower. The loss is estimated at \$250,000.

**CANTON, OHIO.**—It is said that the Structural Steel Car Co., which is building a steel car plant at Canton, has made arrangements to build an open-hearth steel plant adjoining their car plant.

**CHICAGO, ILL.**—The Marine Iron Works has plans made for a new two-story machine shop, 40 x 110 ft.; two-story pipe shop and office building, 50 x 182 ft., and a two-story boiler shop, 62 x 64 ft.

**DENISON, TEXAS.**—The Houston & Texas Central has set aside funds for improvements which include a new roundhouse of 14 stalls, a \$7,000 freight depot, car sheds and shops, and increasing yard facilities.

**EAST ST. LOUIS, ILL.**—The St. Louis Steam Forge & Iron Co., of St. Louis, Mo., will build a plant in East St. Louis to make car axles. L. C. McDonald is President of the company.

It is said that St. Louis and Pittsburgh capitalists, represented by John F. Garrett of St. Louis, Mo., will build a plant in East St. Louis to make structural steel.

**HALIFAX, NOVA SCOTIA.**—The erecting shops of the Rhodes Chyry Co., Ltd., car builders at Amherst, were destroyed by fire to the extent of about \$50,000 on Feb. 22. The plant is one of the largest in the Dominion.

**HUNTINGTON, W. VA.**—The American Car & Foundry Co., we are told, will build an extension to the erecting shop in Huntington, to be 86 x 225 ft., and to be used in connection with building steel underframe cars.

**KANSAS CITY, MO.**—Theo. C. Bates recently explained to the Business Men's Association his plans for the new bridge across the Missouri River and for a new station in the North End.

**LANCASTER, PA.**—The Bellwood Mfg. Co., of Bellwood, Pa., which makes car castings, proposes to build a plant in Lancaster, at a cost of about \$75,000. A new company is being formed, to be known as the Lancaster Castings Co. H. G. Shellenberger is an officer of the company.

The Shepherd Engineering Co. is negotiating with the Board of Trade for a tract of land for a plant in Lancaster.

**LIMA, OHIO.**—Fire on the night of Feb. 23 destroyed the Lima Steel Casting Company's plant, causing a loss of about \$50,000.

**MONTEREY, MEXICO.**—The proposed extension of the works of the Monterey Foundry & Mfg. Co., of Monterey, for the purpose of making gasoline engines, will be a machine shop, 60 x 250 ft.; boiler and blacksmith shop, 80 x 160 ft.; foundry, 60 x 180 ft., and office, 60 x 65 ft. All of the machinery will be bought in the United States.

**NORFOLK, VA.**—It is reported that the Seaboard Air Line is about to make a large addition to its shop equipment in this city by building a new foundry. The improvements will not cost \$400,000, as reported.

The Norfolk Ship Yard & Dry Dock Co., of which John McInnes, of Bath, Me., has been recently appointed Superintendent, expects to begin work within another month. It is possible that the name of the company will be changed to the Hampton Roads Ship Yard & Dry Dock Co. There will be 16 buildings, most of which will be of brick, and some of sheet iron. The site is a tract of 703 acres fronting 5,000 ft. on the Elizabeth River, 100 acres to be used for the shipyard proper. One marine railway will have a capacity of 500 tons; another will have capacity for 1,000 tons. Electric cranes will traverse the yards, and in the center of the water frontage there will be a floating dry-dock with a capacity of 15,000 tons, which later can be enlarged. Geo. W. Atkinson, of Charleston, W. Va., is President; George Blackstone, President of the Union Trust Co. of Baltimore, Md., is Vice-President; Caldwell Hardy, of Norfolk, is Treasurer, and C. W. Tebault, of Norfolk.

**ONEIDA, N. Y.**—Plans have been made for a new station for the New York Central & Hudson River R. R. in Oneida. Work will be begun this spring.

**PHILADELPHIA, PA.**—The American Bridge Co. has submitted plans to the Bureau of Buildings and Inspection for a new machine shop, 50 x 186 ft., at the East Side plant at Pencoyd.

**PITTSBURGH, PA.**—The Baltimore & Ohio will rebuild its Water street passenger and freight stations in the near future. The cost will be between \$350,000 and \$400,000. Plans have been made. The building will be 100 ft. square and will be six stories high.

Follansbee Bros. Co., large dealers in sheet and tin plate, will increase its capital from \$300,000 to \$800,000 and build a sheet and tin plate plant. The location has not been mentioned, although it is said plans are made.

**PORTSMOUTH, VA.**—It is said that the Seaboard Air Line will make extensive improvements at the shops in Portsmouth.

**PROVO, UTAH.**—The Rio Grande Western is said to have plans made for a \$10,000 passenger station in Provo. It is said the company wants to build a station on the opposite side of the street from the present building and that negotiations for the land are not quite finished.

**RUTLAND, VT.**—Newspaper reports announce that Dr. W. Seward Webb, Chairman of the Board of Directors of the Rutland R. R., has made an agreement with the city of Rutland whereby that city will give the railroad company \$25,000 in consideration that the company locate its shops in that city. It is said that the repair shops at Malone, N. Y., will be moved to Rutland, as will also the repair shops of the entire system, including the Canada Atlantic Ry. The plans for the shops have been made and according to these plans the machine shops, 110 x 270 ft., will be located at Franklin and Furnace streets. The boiler house will be 50 x 50 ft. North of the machine shops will be located the blacksmith shops, 120 x 75 ft. There will be a storehouse two stories high, 90 x 75 ft. The freight car and repair shops will be 125 x 320 ft., containing 14 tracks. On the north side of the shops will be a transfer table 70 ft. long, with a 320-ft. pit. North of the transfer pit will be the passenger car repair shops, 200 x 105 ft., with nine tracks. The paint shop will be 250 x 75 ft. There are several other buildings of smaller dimensions. It is said that contracts have been let for about \$20,000 worth of machinery and that other contracts are soon to be let. The shops will be lighted by electricity. The total cost will be about \$225,000.

A new passenger station, to cost about \$150,000, will also be built by the Rutland and the contract for a temporary passenger station is about to be let.

**SALT LAKE CITY, UTAH.**—It is said that bids will be wanted in a few weeks for building and equipping a foundry, 35 x 100 ft. Messrs. Pierpont & Heaton, of Salt Lake, are interested.

**SEATTLE, WASH.**—Thomas R. Shepard, of Burke, Shepard & McGilvray, Counsel for the Great Northern, announces that plans have been made for the terminal improvements in this city, which include a new station. It is also stated that these plans have received favorable consideration and that work will begin soon.

**SHARON, PA.**—The Sharon Foundry Co. has been formed, with \$250,000 capital, to build between South Sharon and Wheatland a large foundry. Joseph Riddell is President, and Thomas Kennedy, Secretary and Treasurer. Contracts for the buildings are about to be let.

The American Bridge Co., Pittsburgh, has the contract for the additions to the National Malleable Steel Casting Works in this city. The contracts aggregate \$150,000.

The Sharon Steel Hoop Co. will build four open-hearth furnaces of 300 tons daily capacity.

**WELLSVILLE, OHIO.**—The American Sheet Steel Co. is spending about \$200,000 in enlarging the capacity of the plant at this place.

**WHATCOM, WASH.**—D. W. Reidelberg, of Seattle, Wash., reports that capitalists of Vancouver have a large tract of land containing material which is good to make cement and a company is formed to build a large plant near Whatcom.

**WINNIPEG, MAN.**—It is reported that contract will soon be let for the new passenger depot to be built in Winnipeg by the Canadian Pacific. The new building will be four or five stories and will be built of stone and brick. It will have a frontage on Main street of 200 ft. The question of building a new hotel has been postponed for further consideration.

#### MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page six.)

#### Canadian Society of Civil Engineers.

An ordinary meeting was held Thursday, Feb. 27. A paper by Mr. J. S. Costigan, A. M. Can. Soc. C. E., on "Data and Notes derived from tests on cement, and also on concrete taken from regular batches used in actual works," was read by the author. A discussion took place on Mr. J. M. Shanley's paper on "The Construction of the Great Northern Railway of Canada."

#### Railway Club of Pittsburgh.

The regular meeting of this Club will be held at the Hotel Lincoln, Pittsburgh, Pa., Friday, Feb. 28, at 2 p.m. Subject for discussion: "Steel Tired Wheels Under Freight Cars." Suggestions as to revision of M. C. B. Rules of interchange will also be considered. New subjects, "The Locomotive," by Ira C. Hubbell, and "The Power Question—Locomotive Repair Shops," by R. W. Stovel.

#### The American Railway Engineering and Maintenance-of-Way Association.

The third annual convention of the American Railway Engineering and Maintenance-of-Way Association will be held at the Auditorium Hotel, Chicago, Ill., March 18, 19 and 20, 1902. The business before this meeting will be the annual election of officers, reports of officers and the consideration of the progress reports of the fifteen standing committees. The meetings will be held in the banquet hall of the Auditorium Hotel from 9:30 a. m. to 12:30 p. m., and from 2 to 5 p. m. each day. Members of the Association are at liberty to invite their friends to attend the sessions of the convention.

#### Franklin Institute.

Some of the subjects announced for the current month are:

Friday, Feb. 21.—Mr. H. F. J. Porter, Bethlehem Steel Company, "The History and Development of the Forging Industry."

Wednesday, Feb. 19.—"The Electro-Chemical Industries at Niagara Falls," by Dr. Joseph W. Richards, Lehigh University. The report of the Special Committee appointed to consider and report on the feasibility and advisability of the adoption of the metric system of weights and measures in the United States.

February 26.—"Poynting's Theorem," Prof. Wm. S. Franklin, Lehigh University. The hearings of the committee on coinage, weights and measures on the metric system, Mr. Jesse Pawling, Jr., Central High School.

Thursday, March 13.—State meeting of the Mechanical and Engineering Section.

#### New York Railroad Club.

"Best Methods in Shop Practice in Meeting the Requirements for the Maintenance of All-Steel Cars; Probable Future Shop Changes Necessary," was the subject discussed at the meeting of Feb. 20. Short papers were read by W. S. Morris, C. & O.; Wm. McIntosh, Central of New Jersey; F. W. Brazier, New York Central; R. L. Gordon, of the Pressed Steel Car Co., and H. S. Hayward, P. R. R. A paper was received from F. W. Coolbaugh, of the Sterlingworth Railway Supply Co., and was read by the Secretary. The papers were short, and covered the progress and durability of the all-steel cars, as well as methods and tools for maintaining and repairing cars. Mr. Morris showed some photographs and described tools and shop equipment for repairs, in detail, giving attention to trucks and bodies. Mr. Brazier told of work done at the East Buffalo shops of the New York Central. Mr. Gordon's paper was valuable, putting the case from the builder's standpoint. Mr. McIntosh dealt chiefly with the utility of the steel car, but also gave some figures and blue prints that will be found interesting when published. Mr. Hayward gave a concise and very favorable record of experience with steel cars. Mr. Coolbaugh's paper was of a general nature. All in all there was much valuable information given and we shall give full extracts of the proceedings when they are available.

#### Engineers' Club of Philadelphia.

A regular meeting of the club will be held on Saturday, March 1, 1902, at 8 o'clock p. m. The subject of the paper has not been received in time for insertion in the notice.

At the meeting of Feb. 15 the special committee presented the following resolutions, which were, upon mo-



tion, adopted: "Resolved, That the Engineers' Club of Philadelphia approves of the plan of setting apart certain areas as and for forest reserves, in which the methods of scientific forestry may be exemplified, and also conservation of water supply and important natural conditions be secured; and, further Resolved, that the club approves especially the plan to establish a national forest reserve in the Southern Appalachian region, in accordance with the provisions of the bill for that purpose, introduced by Senator Prichard and now pending in the Congress of the United States."

Mr. William H. Berry presented the paper of the evening upon "Superheated Steam." After an historical review of the theory of the expansion of steam, he made the statement that steam can be superheated by applying heat to the containing surfaces which are not in contact with water, and devoted the greater part of his remarks to explaining how superheated steam may be employed in practice, and the reasons for the economy resulting from its use. The paper was illustrated with tables showing the results of actual experiments. It was discussed by Messrs. H. W. Spangler, James Christie, Henry J. Hartley and others.

## PERSONAL.

(For other personal mention see Elections and Appointments.)

—Captain Francis Pavy, Chairman of the Railway Share Trust and Agency Company, Limited, and the Railway Debenture and General Trust Company, Limited, died, in England, Feb. 21. He was a director of the Wabash and was connected with different railroads in the United States, and was also the representative of certain Westinghouse interests in England.

—Mr. John B. Sherman, founder of the Union Stock Yards and former President of the Union Stock Yards Transit Company, died, Feb. 25, aged 77 years. Mr. Sherman retired from active part in the management of the Stock Yards two years ago. He was born in the State of New York and went to California in 1849. Six years later he bought the old Bull's Head Stock Yards in Chicago, and was interested in the consolidation of the four stock yards of the city.

—The new Division Superintendent at Franklin Junction, Mo., of the Missouri, Kansas & Texas, Mr. E. J. Lampert, is a native of Ohio, having been born at Crestline in 1864. He has risen from the subordinate positions of messenger, yard clerk, transfer clerk, terminal agent to that of Trainmaster of the Chicago & Calumet Terminal. Mr. Lampert later became Trainmaster of the San Francisco & San Joaquin Valley, from which position he resigned to accept the Superintendency of the Missouri, Kansas & Texas, as stated above.

—Mr. Elliott Woods, of Indiana, who was for several years Assistant to the late Edward Clark, Architect of the U. S. Capitol at Washington, was appointed by the President, on Feb. 20, as Superintendent of the Capitol Building and Grounds, to fill the place created by an Act of Congress approved Feb. 14, 1902. On Mr. Clark's death a few weeks ago it was proposed to make Mr. Woods Architect of the Capitol to succeed him, but this action was opposed by the Institute of Architects on the ground that Mr. Woods is not an architect, and the new place was created to meet this opposition.

—Mr. F. H. Clark, the new Superintendent of Motive Power of the Chicago, Burlington & Quincy Railway, succeeding Mr. Deems, was for several years engaged in consulting engineering work in Chicago in the office of D. L. Barnes, and was also one of the editorial staff of the *Railroad Gazette*. Mr. Clark was formerly Chief Draftsman, and in December, 1899, was appointed Mechanical Engineer. He was graduated from the University of Illinois in the class of '90 as a Mechanical Engineer and four years later he accepted the position of Chief Draftsman of this company. Mr. Clark assumes his new duties on the first of March.

—Mr. Herman F. Ball, who recently succeeded Mr. Marshall as Superintendent of Motive Power of the Lake Shore & Michigan Southern, has been connected with this company since 1890. He was born at Altoona, Pa., in 1867 and entered railroad service in 1884 as an apprentice in the car shops of the Pennsylvania Railroad. This position he held for four years and at the end of that time became Draftsman in the Mechanical Engineer's office. In 1890 Mr. Ball became Chief Draftsman of the Lake Shore at Cleveland, and two years later became General Foreman, and in 1894 was made General Car Inspector, which position he held until 1899, since which time he has been Mechanical Engineer.

—Mr. Frederick Bowen Lincoln, who has recently left the Erie as Division Superintendent at Arnot, Pa., to become General Manager of the Buffalo & Susquehanna Coal & Coke Company, was born in New York City in 1867. He was educated in New England and abroad, and entered the service of the Erie in 1887 as a rodman and was appointed Assistant Engineer in 1891 and Assistant Engineer of the Allegheny Division, June 15, the following year. Six months afterwards he was appointed Assistant Engineer of the Susquehanna Division. In 1895 he was appointed Trainmaster and three years later (1898) was made Superintendent of the Blossburg Coal Company, which embraces all of the Erie Railroad Company's mines and lumbering centers at Arnot, Pa. Mr. Lincoln's headquarters will be, for the present, at Tyler, Pa.

—Mr. Arthur G. Wells, who recently became General Manager of the Santa Fe System West of Albuquerque, was born at Guelph, Ont., Nov. 18, 1861, and 14 years later entered railroad service with the old Kansas City, St. Joe & Council Bluffs. For four and one-half years he served his apprenticeship, later receiving a clerkship with the Chicago, Burlington & Quincy at Aurora, Ill. He then held a similar position on the Atlantic & Pacific (now the Santa Fe Pacific, and one of the roads of which he is now General Manager), also on the Atchison, Topeka & Santa Fe, where he remained until he went to Cincinnati as Assistant to the General Manager of the Ohio & Mississippi, and a little later became Superintendent of the Ohio, Indiana & Western. In 1894 he returned to the Atchison as Assistant to the First Vice-President at Chicago and in 1895 was made General Superintendent of the Atlantic & Pacific. Two years later he became Superintendent and General Manager of the lines west of Albuquerque.

—The new Terminal Engineer of the New York Central & Hudson River, Mr. Arthur R. Cortell, was born at South Abington (now Whitman) in 1860. He was educated in the public schools and Brown University. Mr.

Cortell's engineering career dates from 1877, when he became a Draftsman for the Herreshoff Manufacturing Company at Bristol, R. I., and later was employed in the city engineer's office in Providence. In 1881 he became Assistant Engineer on construction for the New York, West Shore & Buffalo, and in 1884 Supervisor on Maintenance of Way. Two years later he made surveys for the Rockland Lake Railroad, and the following year was engaged in building railroads in Kansas and Colorado for the Missouri Pacific. Mr. Cortell was First Assistant Engineer on construction of the Sioux City Bridge over the Missouri River, which had a pneumatic foundation 92 ft. deep, also Assistant Engineer on the Thames River Bridge and approaches. For five years (1892-1897) he was First Assistant Engineer on the construction of the Providence passenger station. During the three following years he was Principal Assistant Engineer of the South Station in Boston, and since February, 1900, until a few weeks ago, has been Resident Engineer for the Boston Terminal Company.

## ELECTIONS AND APPOINTMENTS.

**Alabama Great Southern.**—V. B. Lang, heretofore Master Mechanic of the Chicago & Alton, has been appointed Master Mechanic of the A. G. S., with headquarters at Birmingham, Ala., effective March 1.

**American-Mexican Pacific.**—The officers of this company are: George P. Blair, President; H. H. Pilling, Vice-President; W. W. Williams, Second Vice-President; R. G. H. Minty, Third Vice-President and Secretary; Lyman Bridges, Chief Engineer and General Manager; John Gardner, Treasurer; H. H. Pilling, Auditor, and S. W. Purcell, Attorney. The Directors, including the above-mentioned, are: W. M. Griffith, A. Bail, F. E. A. Kimball and S. C. Gould.

**Atchison, Topeka & Santa Fe.**—C. M. Taylor has been appointed Mechanical Superintendent, with headquarters at La Junta, Colo.

**Canadian Pacific.**—The jurisdiction of C. W. Spencer, General Superintendent of the Eastern Division, has been extended over the Lake Superior Division, succeeding T. Williams, resigned.

**Chicago & Alton.**—G. Gregg has been appointed Master Mechanic, succeeding V. B. Lang, resigned to go with another company. (See Alabama Great Southern.)

**Chicago & North Western.**—W. D. Cantillon, heretofore Superintendent of the Minnesota & Dakota Division, has been appointed Assistant General Superintendent and is succeeded at Winona, Minn., by H. R. Sanborn. W. D. Hodge succeeds Mr. Sanborn as Superintendent of the Sioux City Division and Mr. Hodge in turn is succeeded at Eagle Grove, Ia., by F. R. Pechin as Superintendent of the Northern Iowa Division, effective March 1.

**Chicago, Burlington & Quincy.**—Thomas Miller, heretofore General Freight Agent, has been appointed Freight Traffic Manager.

**Cleveland, Cincinnati, Chicago & St. Louis.**—G. Wirt has been appointed Master Mechanic of the Cincinnati-Sandusky Division, with headquarters at Delaware, Ohio, succeeding M. Rickert, resigned. H. G. Hudson becomes Master Mechanic of the Michigan Division, succeeding Mr. Wirt, effective Feb. 24.

**Erie.**—The position of Division Superintendent at Arnot, Pa., formerly held by F. B. Lincoln, has been abolished and Jas. Corbett, Assistant Superintendent of the Chicago & Erie, will assume the duties belonging particularly to the railroad, and J. Bailey assumes those of the coal department. Mr. Corbett's headquarters will be at Elmira, N. Y.

**Evansville & Terre Haute.**—E. R. Thomas, President, has resigned. According to reports, E. S. Hooley, Vice-President, will succeed Mr. Thomas.

**Intercolonial.**—Harry Ashton has been appointed Master Mechanic in charge of Moncton Locomotive Shops.

**Lake Erie & Western.**—H. J. Rhein, heretofore General Eastern Agent of the Lake Shore & Michigan Southern, has been appointed General Passenger Agent of the L. E. & W., with headquarters at Indianapolis, Ind., succeeding C. F. Daly.

**Lake Shore & Michigan Southern.**—H. J. Rhein, General Eastern Agent, with headquarters at Buffalo, N. Y., has resigned.

C. F. Daly has been appointed First Assistant General Passenger Agent. (See Lake Erie & Western.)

**Mason City & Fort Dodge.**—J. G. Culliton, heretofore Supervisor of Bridges and Buildings of the Virginia & Southwestern, has taken a similar position with the M. C. & F. D.

**Montana Central.**—E. L. Brown, heretofore Division Superintendent of the Northern Pacific, has been appointed General Superintendent of the M. C., succeeding G. T. Ross.

**Northern Pacific.**—E. L. Brown, Division Superintendent, with headquarters at Duluth, Minn., has resigned. (See Montana Central.)

**North Shore.**—E. D. Thomas has been appointed General Auditor.

**Pennsylvania.**—J. M. Henry has been appointed Assistant Engineer of Motive Power, with headquarters at Williamsport, Pa., succeeding H. A. Fergusson.

**Pittsburgh & Castle Shannon.**—At a meeting held recently, S. M. McElroy was elected President; J. W. Friend, Vice-President; F. V. Matthews, Secretary, and E. J. Reamer, Treasurer and Assistant Superintendent.

**Southern Pacific.**—E. L. Swaine, Assistant Superintendent at Los Angeles, Cal., will, until further notice, assume the duties heretofore discharged by Division Superintendent J. A. Muir, resigned.

**Tennessee Central.**—L. S. Miller has been appointed General Manager, succeeding W. B. Doddridge, resigned. E. H. Hinton becomes Traffic Manager, and Gustaf Bottlinger succeeds F. M. Bisbee, resigned, as Chief Engineer. Wm. Mack Baxter becomes Assistant to the President, and H. B. Miller, Claim Agent.

**Wabash.**—M. R. Coutant has not, as stated last week, been appointed Division Master Mechanic. Mr. Coutant is merely handling the business of the motive power department of the Buffalo, Detroit & Eastern Divisions for the Superintendent of Motive Power.

## RAILROAD CONSTRUCTION.

### New Incorporations, Surveys, Etc.

**ALCOLU.**—An officer writes that work is in progress on the extension of this line, which is to run northeast and north from Alcolu, S. C., a distance of 40 or 50 miles. The work is easy and a very small force of men is at work. There are no important trestles, tunnels or bridges and there are no contracts to be let. (Feb. 14, p. 121.)

**BALTIMORE & FREDERICK ELECTRIC.**—This company has taken over the controlling stock of the Woodsboro & Liberty Turnpike Co., and it is thought that the proposed line will be built at once. The route as now decided on runs from Baltimore via North Branch, Eldersburg, Winfield, Taylorsville, Unionville and Liberty to Frederick, a total of 45 miles, following in the main the old Liberty road, with the exception of a few places where grades are avoided. Surveys are to be made at once. (Jan. 17, p. 49.)

**BALTIMORE & OHIO.**—An officer denies the report that an extension is at present to be built from Romney, W. Va., to Petersburg, 35 miles. (Feb. 14, p. 121.)

**CANADIAN PACIFIC.**—During the present season it is planned to build 200 miles of new road in Manitoba, as follows: A line to run in a northwesterly direction crossing the Qu'Appelle River at Scissors Creek to Pheasant Hill, a distance of from 90 to 100 miles. The road from Wascada to Lytleton, all graded, will be laid with rails. This is 21 miles long. The road from Snowflake to Mowbray, 12 miles, is now also ready for the rails. A new line 42 miles long is to be built from Forrest to Lenore. Ten miles on a route between Wellwood and Brookdale has already been graded and this will be extended to Forrest, the whole being a distance of about 32 miles. The new line between Selkirk and Winnipeg Beach is also ready for track laying as soon as the weather permits.

**CAROLINA & NORTHWESTERN.**—Grading is reported on the change of location at Long Shoals, N. C., near Lincolnton. This involves a new line about 12 miles long to reach some factory properties, at present without railroad facilities. It is said that the grading will be completed by March 15.

**CHICAGO GREAT WESTERN.**—The contract for the new 36-mile line between Harlan and Council Bluffs, Iowa, the grading of which was let to Winston Bros., has been sub-let as follows: First four miles out of Council Bluffs, and local yards, Hall Construction Co., of St. Louis; next five miles, Phelan & Shirley, of Omaha; next three miles, Butler & Ryan, of Minneapolis; next five miles, Vaughn & Conroy, of St. Louis; next seven miles, James O'Connor, of Underwood, Ia.; last twelve miles, E. A. Wickham, of Council Bluffs.

**COLUMBUS, EUFAULA & GULF.**—An application for a charter has been made by this company at Columbus, Ga. It is proposed to build from Columbus to St. Andrew's Bay, Fla., by way of Eufaula, through the counties of Muscogee, Russell, Henry and Barbour, in Alabama, and Jackson and Washington, in Florida, a total of 200 miles. B. H. Tyson, Fred. Robler and others are incorporators. The company's office will be at Columbus.

**CRANBERRY LAKE.**—This company filed certificates of incorporation at Albany, N. Y., Feb. 24, with authorized capital of \$80,000, to build a steam railroad eight miles long from Benson mines to a point on the Inlet of Cranberry Lake, St. Lawrence County. The directors are: H. C. Rich, C. R. Rich and H. B. Easton, of Cattaraugus, N. Y., and others.

**CRESCENT LINE (COLORADO).**—Contract for grading the new line with the above title, which is to run from Loveland sugar factory to Berthoud, Colo., a distance of 25 miles, has been let to W. A. Riley.

**DAKOTA EASTERN.**—This company has been organized in South Dakota to build from Watertown to Sioux Falls, S. Dak., by way of Fargo, N. Dak. The directors are: H. D. Walruth, W. D. Morris and others, of Watertown.

**DES MOINES INTERURBAN (ELECTRIC).**—Work has been begun on the grade of this new electric line between Des Moines and Colfax, Iowa, 20 miles, and all the necessary materials for building have been delivered. It is the intention of the company to have the line in operation during June. Contracts for 29 small bridges have been let to Magden & Sheeley. (Dec. 6, 1901, p. 850.)

**DETROIT RIVER & LAKE ERIE TERMINAL.**—This company was recently incorporated in Michigan to build a road from Twelfth and Howard streets, Detroit, to a point in Mongaugon Township, a distance of about 12 miles. The articles of association provide that the line may be equipped either with steam or electricity. The directors are C. E. N. Coles, D. B. Cunningham and others, of Detroit.

**DOTHAN, HARTFORD & FLORIDA.**—An officer writes that right of way has been secured for this new line from Dothan, Ala., on the Alabama Midland, by way of Graceville and Chipley, Fla., south and southeast to St. Joseph's Bay, Fla., 117 miles. The road, incorporated Oct. 25, 1899, is now entirely located. Plans are completed and contracts have been let to B. H. Hardaway, of Columbus, Ga. The Union Trust Co., Philadelphia, is trustee, and bonds are now ready to be delivered to purchasers. Fourteen miles of right of way have been cut and two miles graded. The company will use 56-lb. re-laying steel rails. J. P. Pelham, Dothan, Ala., is President, and C. R. Garrard is Chief Engineer. (Oct. 25, p. 745.)

**EL PASO & SOUTHWESTERN.**—It is said that arrangements have been completed for an extension 10 miles long from Fairbank, Ariz., to Tombstone. (Construction Supplement, Oct. 11, 1901.)

**GRAND TRUNK OF CANADA.**—As the result of a recent conference between the officers of this company and the City Council and Board of Trade of Brantford, Ont., the Grand Trunk has agreed to divert its main line so as run to Brantford, which is now reached by a spur from Harrisburg, on the main line, eight miles distant. The city agrees to build a subway and make certain other concessions, including a cash bonus of \$57,000.

**HOUSTON & TEXAS CENTRAL.**—It is said that a line will be built from Navasota, Tex., north to Madisonville, a distance of about 50 miles, with the intention of continuing it to Corsicana, 125 miles.

**INTERNATIONAL & GREAT NORTHERN.**—Surveys are reported for the proposed entrance of this company into Waxahachie, Texas, and it is said that the line will be running by Aug. 1. (Jan. 3, p. 14.)

**MARYLAND & PENNSYLVANIA.**—It is said that the line between Baldwin and Fallston, Md., four miles, will be rebuilt to take out some sharp curves and trestling which



exist at present. The plan also includes a steel viaduct over Little Gunpowder River.

**MAUMEE CONNECTING.**—This company was incorporated at Columbus, Ohio, Feb. 20, with a capital stock of \$25,000, to build a steam railroad in and about Toledo, uniting the terminal facilities of the Hocking Valley and the Toledo & Ohio Central railroads, which are now under one control.

**METHOW RAILWAY & SMELTING.**—Articles of incorporation were filed by this company in the State of Washington, Feb. 13. The company has a capital of \$36,000, and is a preliminary organization to secure rights of way for the proposed Methow Valley R. R., which is to run up the Methow and Twist rivers. It is said that surveys are to be made at once.

**MEXICAN CENTRAL.**—An officer denies the report that a branch line is to be built from San Juan to the Cerralve mining district.

**MEXICAN NATIONAL.**—An officer writes that surveys are being made for an extension in Mexico from a point in the general vicinity of Teoloyucan, on the main line. The reported termini of Teoloyucan and Salvatierra are not to be used, however, and the location of the line will not be definitely known until the surveys are complete. No other information is yet obtainable, except that it is intended that the maximum grade shall be 1 per cent., compensated, and the minimum radius of curves is to be 191 meters. R. T. Macdonald is Chief Engineer.

**MEXICO ROADS.**—A company has been organized composed of San Francisco, New York and Philadelphia men, with a capital stock of \$2,000,000, to build a railroad from the Port of Guaymas, on the Gulf of California, in Mexico, to newly discovered coal fields 125 miles southeast. It is said that building will begin shortly. Gen. W. P. Egan, of San Francisco, is interested.

**MINNEAPOLIS, ST. PAUL & SAULT STE. MARIE.**—An officer writes in reference to press reports, that the company does not intend to extend its lines this year in South Dakota.

**MISSOURI, KANSAS & TEXAS.**—Grading is reported begun on the proposed extension from Coffeyville, Kan., to Guthrie, Okla., about 200 miles southwest. Work began at the Guthrie end. (Dec. 6, 1901, p. 850.)

**NASHVILLE & LEWISBURG.**—This company was chartered in Tennessee, Feb. 19, with a capital stock of \$25,000, to build a railroad between Nashville and Lewisburg, in Marshall County, about 75 miles distant. It is not yet decided whether the motive power will be steam or electricity.

**NEPAGON.**—This company secured an act from the Ontario Legislature, Feb. 19, granting it powers to extend its terminus on Lake Nepigon as far north as James Bay, with a branch to Port Arthur and Fort William, and an extension of time for its completion. Permission to use either steam or electricity was given.

**NEVADA-CALIFORNIA-OREGON.**—Surveys are reported for the proposed extension from Madeline, Cal., to Lake View, Ore., 95 miles. The line has recently been completed between Termo, Cal., and Madeline, and it has been the company's intention for some time to eventually extend it to Lake View. (Dec. 20, 1901, p. 884.)

**NEVADA-CALIFORNIA-OREGON.**—Surveys are reported once on this new line, which is to be an extension of the old Nevada Central from Austin to Tonapah, 120 miles. This in connection with the 90 miles of old road will give over 200 miles. It is thought that the prospects for immediate building of the entire line are very good indeed. (Feb. 14, p. 122.)

**NEW YORK CENTRAL & HUDSON RIVER.**—An officer denies the report that the Pennsylvania Division is to be extended from its present terminus to Karnes City, as currently stated in press reports. (Feb. 21, p. 138.)

**NORTHAMPTON (LEHIGH & NEW ENGLAND).**—An officer writes that two-thirds of the work on this new line between Bath, Pa., and the Delaware River by way of Nazareth, 15 miles, is completed and that the contracts are already let. The President is Frank Reeder, and Wm. J. Turner is Vice-President instead of President, as stated last week (Feb. 21, p. 138.)

**NORTHERN MICHIGAN.**—Maps have been filed by this company showing the complete line from St. Ignace to Sault Ste. Marie. It is said the road will be completed and run before Aug. 15. Water frontage for docks has been secured at St. Ignace and work will be begun very soon on the ferry and merchandise dock. (Construction Supplement, Oct. 11, 1901.)

**OREGON SHORT LINE.**—Maps have been filed for the proposed new line between Garfield and Lemington, Utah. The old survey between these towns is on a curve, whereas the new route shows a straight line 90 miles long. It is said that contract for the work will be let shortly.

**PACIFIC ELECTRIC.**—An officer writes in regard to the recent extension of electric lines in California, that the Pacific Electric Co. has at present 40 miles of road in operation from Los Angeles through Garvanza, Pasadena and Altadena to Mt. Lowe, carrying passengers, express and mail. Contracts have been let for a new line to Pasadena, about 12 miles long; also to San Gabriel Mission, a 4-mile spur from the Pasadena line; and also from the Pasadena line to Monrovia, about 10 miles, and a double track road from Los Angeles to Long Beach, 21 miles. Besides passengers, express and mail, the company expects to do a light freight business on these lines. There are other lines in contemplation, in regard to which no decision has, as yet, been made. The Los Angeles R. R. Co., under the same management, comprises about 98 miles in the city of Los Angeles. H. E. Huntington is President of the Los Angeles Pacific Co. and of the Pacific Electric Co.

**PARRY SOUND & SUDBURY.**—The spur line recently built from Depot Harbor to Parry Sound, Ont., seven miles, by Mackenzie & Mann, and just opened for traffic with the Canada Atlantic, is to be extended to Sudbury, 90 miles distant. (Construction Supplement, Oct. 11, 1901.)

**PITTSBURGH, TOLEDO & WESTERN.**—An officer writes that contracts are now ready to be let for this new line in Ohio from a point on the Ohio River, near Mingo, to a connection with the Wheeling & Lake Erie, 21 miles distant. J. W. Patterson is Chief Engineer. (Construction Supplement, Oct. 11, 1901.)

**QUEBEC & NEW BRUNSWICK.**—An officer writes that no work has as yet been done on this proposed line from Chaudiere Junction, Que., towards the present terminus of the St. Francis Branch of the Temiscouata, N. B., and thence to the mouth of the St. Francis River, a total

of 63 miles. It is intended that work shall begin some time this spring, however. J. Costigan is President.

**QUEBEC & NEW BRUNSWICK.**—This road, running between Quebec and Edmonton, N. B., 140 miles, is reported to have completed financial arrangements for building, and it is said that work will be begun this spring by Mr. Thomas Malcolm, who will carry it on at the same time with the Restigouche & Western, now building by him.

**ROCK HILL.**—Application for charter has been made by this company at Columbia, S. C. It is proposed to build a line between Rock Hill and Hermon, York County, S. C. T. J. Roddey, of Rock Hill, is interested.

**ST. LOUIS & SAN FRANCISCO.**—Bills have been introduced in the Senate and House of Representatives at Washington to grant this company right of way through Oklahoma and Indian Territory, with power to operate a railroad and telegraph and telephone lines from a point on this line between Claremore, Ind. T., and Chandler, Okla. T., southeast to a point on this line between Fort Smith, Ark., and Wister, Ind. T., with additional right to build further branches in Indian Territory. The company is authorized to take a strip of land 100 ft. wide, and also a strip of land 200 ft. wide and 3,000 ft. long every 10 miles for side tracks and stations. Compensation to the Indians through whose land the road passes is to be made at the rate of \$50 a mile, and \$15 a mile shall be paid annually for the franchise. It is provided that at least 50 miles of railroad shall be built within three years after the passage of the bill. The projected line could not be less than 125 miles long. (Oct. 18, 1901, p. 730.)

**ST. LOUIS, MEMPHIS & SOUTHEASTERN.**—Work has begun on this new line in Missouri, which was organized Jan. 8. The route when completed will be 170 miles long, and location is now in progress on that part which is not building. Parts of the work will be very heavy and difficult. The number of bridges required has not yet been determined. (Jan. 17, 1902, p. 50.) (Official.)

**SEABOARD AIR LINE.**—Work by a large force is reported on a new line from Plant City, Fla., to Charlotte Harbor, a distance of about 80 miles, air line. Charlotte Harbor is much nearer Key West than Tampa, and it is thought that it will be used as a terminal.

**SOUTHERN PACIFIC.**—Work is reported altering the narrow gauge line between Oakland and Alameda, just south, to standard gauge, by laying a 70-lb. third rail. The standard gauge freight slip at Alameda Mole is almost completed and these improvements will afford greatly increased facilities for handling local and through passenger traffic on the water front of Oakland.

An officer writes in regard to the proposed extension between Rusk and Dialville, Texas, that no decision in regard to building has as yet been made.

**SOUTHWESTERN OF ARIZONA.**—An officer writes that the extension from Don Luis, on the Arizona & Southeastern, southeast to Douglass, on the Mexican border, 23 miles, and from Douglass northeast to the New Mexico line, 51 miles, is completed and in operation. Work is also in progress on the new line from Hermanas to El Paso, 93 miles. (Construction Supplement, Oct. 11, 1901.)

**TEXAS CENTRAL.**—An officer writes that location is completed on the proposed extension between Waco and Ross, Texas, 11 miles north. Contracts for grading will be let some time this week, providing the right of way is secured. The bridges have been purchased, and contracts for the masonry have been let; the character of the work is easy, with a maximum grade of  $\frac{3}{4}$  of 1 per cent. There is one 5 deg. curve getting into Waco, but the balance of the line is on a tangent, excepting for two slight inclines requiring 1 deg. curves. There are no trestles or tunnels on the line, and there are two iron and steel bridges, one of which is 95 ft. long and the other 75 ft. Seventy-seven and one-half pound rails will be laid, and these have already been purchased. The cost of the above work is to be met by new securities at 4 per cent. to the amount of \$150,000. Chas. Hamilton, of Waco, is General Manager.

**SUMPTER VALLEY.**—An officer writes that no decision has as yet been made in regard to the proposed extension which was to run from Whitney, Mich., through Grant County into Harney to Burns. (Dec. 20, 1901, p. 884.)

**TACOMA & SEATTLE INTERURBAN (ELECTRIC).**—Work is reported on this new line in Washington between Tacoma and Seattle, 36 miles long. The contract was originally to have been completed by Nov. 1, 1901, but was thrown up by the contractors after a series of delays and the grading is now being hurriedly completed by their bondsmen, the United States Fidelity & Guaranty Co. It is thought that the grades, which are now completed except for about 12 miles, will be finished April 15, and that the line will be in operation by June.

**TENNESSEE CENTRAL.**—Contract for building the terminal facilities of this company at Nashville, Tenn., has been let to John Smith, Jr. It is said that the cost of the work will be between \$50,000 and \$75,000.

**TIMAGAMI.**—An officer writes in regard to this proposed line in Ontario from Sturgeon Falls, on the line of the Canadian Pacific, to a point on the south end of Lake Timagami, via Sturgeon River Valley, a distance of 40 miles, that it is expected to let contracts for the first 10 miles about the first of May. Nothing has been done, as yet. The road was incorporated in 1900, and George E. Silvester, Sudbury, Ont., is Engineer.

**UNION TRACTION OF INDIANA.**—Rights of way are reported practically secured for this new line in Indiana between Indianapolis, Noblesville and Kokomo, a total of about 55 miles. It is said that surveys have been made and the necessary funds secured, and that work will begin as soon as the weather permits. (May 10, 1901, p. 324.)

**WASHINGTON ROADS.**—A project is announced of a new line to run from Spokane 50 miles northwest to Fruitland and thence along the Columbia River to the east bank, 35 miles to Kettle Falls. The line is to cross at Kettle Falls and continue up the west bank 38 miles further to Trail, B. C., a total of 123 miles. The Canadian Pacific is said to be interested and a connection with this company will be afforded at Trail.

#### GENERAL RAILROAD NEWS.

**BIRMINGHAM RY., LIGHT & POWER Co.**—Ladenburg, Thalmann & Co. are offering \$3,750,000 first consolidated mortgage 5 per cent. bonds, due July 1, 1951, or on call after five years at 110. The company gives the following information regarding the line: "The Birmingham Ry., Light & Power Co. is a consolidation of the Birmingham Gas Co., the Consolidated Electric Light Co. and the Birmingham Ry., Light & Power Co. The franchises are perpetual and as the new additions of Alabama limits the franchises to 30 years, the perpet-

uity of the rights of this company is an extremely valuable asset. The authorized bond issue is \$6,000,000, \$3,750,000 of which are at present outstanding, and \$1,250,000 held by the trustees to retire an equal amount of first mortgage bonds of the old Birmingham Ry. and Electric Co. The balance of \$1,000,000 can only be used for extensions and improvements, to the amount of 75 per cent. of their actual cash cost, the company providing the remaining 25 per cent. The present issue of bonds is a first mortgage on all of the property of the company now owned or hereafter to be acquired, excepting on about one-half of the street railroad mileage, which is covered by the above-mentioned mortgage; for the redemption of which bonds of this issue are now in the hands of the Trustee." The company operates 65 miles of track.

**BUFFALO, ROCHESTER & PITTSBURGH.**—Estimated earnings for the month of February, 1902, are \$141,796, as compared with \$201,653 for the same month last year, a decrease of \$59,856. Earnings for the second week in February show a decrease of \$22,412 over the same week last year.

**INDIANAPOLIS, SHELBYVILLE & SOUTHEASTERN TRACTION.**—This company filed, on Feb. 24, a mortgage on its property to secure bonds at 5 per cent., on which payments must begin not later than 1908. A sinking fund of \$10,000 a year is also provided. It is thought that this will insure the completion of this line during the coming summer. The distance from Indianapolis to Shelbyville, Ind., is about 26 miles, air line.

**INTERNATIONAL RAILWAY.**—This company was formed in New York State, Feb. 19, as a consolidation of the Buffalo Ry. Co., the Buffalo & Niagara Falls Electric; Buffalo, Tonawanda & Niagara Falls; Niagara Falls & Suspension Bridge; Buffalo & Lockport; Lockport & Olcott and Niagara Falls Suspension Bridge companies. These lines aggregate considerably over 250 miles. The capital stock is \$10,120,500 and the directors are F. L. Stetson, J. P. Ord, D. S. Lamont, Chas. Steele, Daniel O'Day, of New York, and others.

**INTERURBAN STREET (NEW YORK).**—This company, which is to lease the Metropolitan Street Ry., in accordance with the plan for the reorganization of that property recorded last week, increased its capital stock on Feb. 15 from \$500,000 to \$20,000,000, and the plan provides that the Metropolitan Securities Co. shall pay to the Interurban Co. \$23,000,000 in cash, receiving in return Interurban stock at par and debentures bearing not over 4 per cent., these securities to be held by the Metropolitan Securities Co. and not put on public sale. The Interurban Co. proper was organized in November, 1901, to acquire the North Mount Vernon Street, the New York, Westchester & Connecticut Traction, the People's Traction, and the Westchester Electric lines. Only four miles of these lines are now in operation, but 80 miles of franchises are owned in the Bronx and adjacent territory.

**GULF & SHIP ISLAND.**—Fisk & Robinson, 36 Nassau St., New York, offer for sale the remaining \$1,000,000 of an issue of \$2,750,000 bonds, \$1,750,000 already having been placed by private subscription. The bonds are to be issued to refund the previous bonded indebtedness of the company, which operates a line from Gulfport, Miss., on Mississippi Sound, Gulf of Mexico, 160 miles north and northwest to Jackson, with branches aggregating 93 miles. The company's first refunding and terminal mortgage issued to secure its 50-year 5 per cent. gold bonds covers the entire property, including terminals. The total authorized issue of bonds is \$5,000,000, of which \$2,750,000 has been issued to refund and re-adjust the bonded debt as heretofore existing. Only \$30,000 of the old bonds remain outstanding and with this exception the new bonds are secured by an absolute first mortgage lien. The balance of the authorized issue is reserved for future betterments, etc. The price for the bonds now offered is 104½ and accrued interest.

**KANSAS, PEORIA & CHICAGO.**—This railroad, which extends from West Quincy to Pattonsburg and thence south to Kansas City, Mo., a total of 242 miles, has been sold to the Chicago, Burlington & Quincy. The portion from Plattsburg, Mo., south 46 miles to Kansas City, has, however, been sold by the Chicago, Burlington & Quincy to the Chicago, Rock Island & Pacific.

**NASHVILLE & KNOXVILLE.**—Report is received that this property was sold to the Tennessee Central on Feb. 19. The Nashville & Knoxville extends from Monterey to Lebanon, Tenn., 110 miles, and is an important link in the proposed Tennessee Central system. The price reported was \$500,000.

**NEW YORK, NEW HAVEN & HARTFORD.**—The company has bought from the State of Massachusetts a tract of 20 acres of the South Boston flats, paying, it is said, \$1,000,000. This land, most or all of which is under water, adjoins the present deep-water freight terminal grounds of the road, and is to be filled in for the enlargement of these terminals.

**NORTHERN SECURITIES CO.**—The Supreme Court of the United States, on Feb. 24, refused to take jurisdiction in the suit which the State of Minnesota recently asked leave to enter against this company. The Court held that as the Great Northern and the Northern Pacific railroad companies are indispensable parties, without whose presence the Court, acting as a court of equity, cannot proceed, and as the Court's constitutional jurisdiction would not extend to the case if those companies were made parties defendant, the motion for leave to file the proposed bill must be denied. On Feb. 19, the Attorney-General of the United States announced that he would soon apply to one of the United States courts for an order dissolving the Northern Securities Company, on the ground that it violates the Sherman Anti-Trust law of 1890. Attorney-General Knox says that some time ago President Roosevelt requested from him an opinion as to the legality of the virtual merger of the Northern Pacific and the Great Northern which was effected by the organization of the Northern Securities Company, and, this opinion being to the effect that the organizers have violated the Sherman law, the President thereupon directed the Attorney-General to take suitable action. On the announcement of these facts the price of the stock of the Securities Company fell about 4 per cent. and this fall was accompanied by declines in many other securities—in fact, by what Wall street called a decided slump; though the general market recovered the next day. Some discussion of the action of the Court and of the President will be found in the editorial column.

**TENNESSEE CENTRAL.**—Advices are received to the effect that the sale of the Nashville & Knoxville to this company has taken place, and that payment of \$500,000 was made Feb. 19. The Nashville & Knoxville extends from Monterey to Lebanon, 110 miles.